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Region 2

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Response Action Contract

FINAL
FEASIBILITY STUDY REPORT
FOR
OPERABLE UNIT 2 (OU-2)
FACILITY SOILS AND BUILDINGS
FOR
CORNELL-DUBILIER ELECTRONICS
SUPERFUND SITE
SOUTH PLAINFIELD
MIDDLESEX COUNTY, NEW JERSEY

APRIL 2004

Contract Number: 68-W-98-214

TETRA TECH FW, INC.

400087A

EPA WORK ASSIGNMENT NUMBER 118-RICO-02GZ
EPA CONTRACT NUMBER 68-W-98-214
TETRA TECH FW, INC.
RAC II PROGRAM

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TETRA TECH FW, INC.

06 April 2004
RAC II-2004-051

Mr. Pietro Mannino
Work Assignment Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007-1866

**SUBJECT: USEPA RAC II CONTRACT NUMBER 68-W-98-214
WORK ASSIGNMENT NUMBER 118-RICO-02GZ
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
FINAL FEASIBILITY STUDY REPORT
OPERABLE UNIT 2 (OU-2) - FACILITY SOILS AND BUILDINGS**

Dear Mr. Mannino:

Tetra Tech FW, Inc. (TtFW) is pleased to provide three copies of the "Final Feasibility Study Report for Operable Unit 2 (OU-2) - Facility Soils and Buildings for Cornell-Dubilier Electronics Superfund Site." The report text, tables, figures and appendices are all included within the one volume.

Please contact me at (973) 630-8517 or lhaymon@ttfwi.com if you have any questions on this submittal.

Sincerely,

Lee Haymon

Lee Haymon
Project Manager

Enclosure:

ISO 14001

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TABLE OF CONTENTS

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
FEASIBILITY STUDY REPORT
for
OPERABLE UNIT 2 (OU-2)
FACILITY SOILS AND BUILDINGS

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Cont'd)

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Feasibility Study (FS) was performed by Tetra Tech FW, Inc. (TtFW) for the Cornell-Dubilier Electronics Superfund site (the site) located in South Plainfield, Middlesex County, New Jersey, in response to Work Assignments 018-RICO-02GZ and 118-RICO-02GZ, issued under the Environmental Protection Agency (EPA) Response Action Contact Number 68-W-98-214. This FS was conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C.§9601 *et seq.*, TtFW's EPA-approved Final Work Plan and current EPA guidance. The focus of this FS facility is the soils and buildings (OU-2).

Nature and Extent of Contamination

The nature and extent of contamination for the facility soils and buildings was assessed as part of the OU-2 remedial investigation (RI). During the RI, a facility total of 208 samples were collected: 96 shallow soil samples; 59 subsurface soil samples; 32 building floor dust samples; 10 perched water samples; 5 drainage system sediment samples; and 6 drainage system standing water samples. Polychlorinated biphenyls (PCBs) are the most prevalent contaminants found on the property. Almost all of the samples (92 percent) indicated the presence of PCB compounds. The highest levels of these compounds occurred in the central undeveloped portion of the facility where test pit excavations unearthed capacitors that appeared corroded and/or partially burned. In addition, shallow soils in parts of the southern developed, northeastern undeveloped, and floodplain undeveloped portions of the property contained concentrations of PCBs greater than 10,000 times the most stringent screening criteria (0.371 mg/kg). Elevated concentrations (*i.e.*, up to 600 times the most stringent subsurface screening criteria of 0.49 mg/kg) were also detected in the deeper overburden soils. In addition, dust samples collected from the on-site buildings contained Aroclor-1254. Dioxins and furans were detected at concentrations exceeding screening criteria (3.15 pg/g) in locations SS03 and MW09. Volatile organic compounds (VOCs), especially trichloroethene (TCE), were detected in the soils, perched water, and drainage system water samples. The more elevated concentrations of TCE in the soils (47,000 ug/kg) and perched water (15,000 ug/L) were present in the southern developed and central undeveloped portions of the property. Elevated concentrations of semi-volatile organic compounds (SVOCs) were detected in the vicinity of the historic fuel tank area, within test pits with debris, and from an area with semi-dried tar. Pesticides and metals were also detected in soils at concentrations exceeding their respective screening criteria values.

Development of Remedial Alternatives

Remedial action objectives were identified and technologies were screened in the FS, resulting in the development of five remedial alternatives for contaminated soil (S), and three remedial alternatives for contaminated buildings (B). These alternatives are summarized below.

Alternative S-1: No Action
In this alternative, no remedial activities or site monitoring would be performed. The No Action alternative provides the baseline case for comparison with other remediation alternatives for soils.

As required by CERCLA, regular five-year reviews would be performed to assess the need for additional remedial actions in the future.

Alternative S-2: Excavation/Off-Site Disposal/Institutional Controls

This alternative consists of the excavation and off-site disposal of the contaminated soils that exceed New Jersey Department of Environmental Protection's (NJDEP's) Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for all contaminants except PCBs, and excavation of soils containing PCBs at concentrations greater than 10 ppm (approximately 272,000 cubic yards of soil). This excavation encompasses the capacitor disposal areas. The total impacted area is approximately 18.1 acres. Engineering controls would be implemented over any areas of the property with PCB concentrations above 2 ppm. Institutional controls would also be implemented for the property to ensure that any future site activities would be performed with knowledge of the site conditions and implementation of appropriate health and safety controls, and to prohibit future unrestricted use of the property.

Alternative S-3: "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/Institutional Controls

This alternative consists of the excavation and off-site disposal of the contaminated soils considered to pose a "principal threat" at the property, including soils that exceed IGWSCC for all contaminants except PCBs, soils containing PCBs at concentrations greater than 500 ppm (approximately 107, 000 cubic yards of soil) and the capacitor disposal areas. Contaminated soils containing less than 500 ppm but greater than 10 ppm PCBs would be capped with a multi-layer cap to minimize contaminant mitigation. Engineering controls would be implemented over any areas of the property with PCB concentrations above 2 ppm. Institutional controls would be implemented as described in Alternative S-2.

Alternative S-4: Soil Vapor Extraction (SVE)/Solidification/Multi-Layer Cap/Institutional Controls

This alternative includes installation of a SVE system in order to address VOCs above IGWSCC and the solidification of soils that exceed IGWSCC for all contaminants except PCBs and soils with PCBs at concentrations greater than 500 ppm (approximately 107,000 cubic yards of soil). Approximately 6.7 acres would be treated using the SVE system. This alternative also includes the excavation and off-site disposal of the capacitor disposal areas. A multi-layer cap, as described in Alternative S-3, would be placed over areas that exceed IGWSCC for other constituents and soils with PCB concentrations greater than 10 ppm. Engineering controls would be implemented over any areas of the property with PCB concentrations above 2 ppm. Institutional controls would be implemented as described in Alternative S-2.

Alternative S-5: Low Temperature Thermal Desorption/Multi-Layer Cap/Institutional Controls

This alternative consists of the thermal desorption of approximately 107,000 cubic yards of soil that exceed IGWSCC for all contaminants except PCBs and soils with PCBs at concentrations greater than 500 ppm. A multi-layer cap, as described in Alternative S-3, would be placed over areas with PCB concentrations greater than 10 ppm. Engineering controls would be implemented over any areas of the property with PCB concentrations above 2 ppm. Institutional controls would be implemented as described in Alternative S-2.

Alternative B-1: No Action

In this alternative, no remedial activities or site monitoring would be performed. The No Action alternative provides the baseline case for comparison with other remediation alternatives for the buildings. As required by CERCLA, five-year reviews would be performed to assess the need for additional remedial actions in the future.

Alternative B-2: Decontamination and Surface Encapsulation/Institutional Controls

This alternative consists of surface decontamination, surface encapsulation, and institutional controls. A total of approximately 765,000 square feet of interior building surfaces would be addressed. Alternative B-2 is formulated to address Remedial Action Objectives (RAOs) through application of 40 CFR 761.79 and 40 CFR 761.30(p), which allow PCB-contaminated porous surfaces to be managed in-place for the remaining life of the surface, provided that the conditions in the regulations are met. Long-term monitoring five-year reviews, and the need for institutional controls as with soil alternatives would be required.

Alternative B-3: Demolition/Off-Site Disposal

This alternative consists of the demolition of the on-site buildings. Demolition of all the on-site buildings would result in an estimated 22,000 tons of debris that would be transported off-site for disposal.

Comparative Analysis of Alternatives for Facility Soils

A detailed evaluation of remedial alternatives using the CERCLA criteria was performed, followed by a comparative analysis of alternatives. These analyses are summarized in the following paragraphs.

Overall Protection of Human Health and the Environment: Alternative S-2 would be the most protective of human health and the environment, since the largest quantity of contaminated soil would be removed from the facility property; engineering and institutional controls would mitigate any residual risks. The residual risks for Alternatives S-3, S-4, and S-5 would vary, and would all be higher than Alternative S-2; however, the residual risks associated with all of these alternatives would be mitigated by placement of a multi-layer cap and engineering and institutional controls. Alternative S-1 would not be protective of human health and the environment.

Compliance with ARARs: Alternative S-1 (No Action) does not satisfy contaminant-specific and action-specific ARARs because federal and state standards are currently exceeded for the contaminants of concern in the impacted media. No location-specific ARARs would be triggered by the No Action Alternative.

There are no chemical-specific ARARs for the contaminated soils. EPA's August 1990 guidance entitled "A Guide on Remedial Actions of Superfund sites with PCB Contamination" recommends a cleanup goal of 1 ppm for unrestricted land use and a range between 10 to 25 ppm for commercial/industrial properties. The state of New Jersey has developed state-wide residential direct contact soil cleanup criteria (RDCSCC) for PCBs of 0.49 ppm and non-residential direct contact soil cleanup criteria for PCBs of 2 ppm for commercial/industrial properties which are "To

400099

Be Considered" criteria. In addition, New Jersey has developed impact to groundwater cleanup criteria for various contaminants (also "To Be Considered" criteria).

If subsurface archeological sites are discovered within the facility property and determined to be eligible to the National Register of Historic Places (NRHP) under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. A Memorandum of Agreement (MOA) will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

Long-Term Effectiveness: Alternative S-2 would provide the highest long-term effectiveness, since the largest quantity of contaminants would be removed from the property. Alternatives S-3, S-4, and S-5 would leave higher residual contamination levels than Alternative S-2. The effectiveness, from highest to lowest, is; S-2, S-3, S-5, and S-4. Alternative S-1 allows the highest residual contamination to remain at the property, and does not provide any mechanism to mitigate existing risks.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Alternative S-2 provides the greatest reduction in toxicity, mobility, and volume of contamination at the facility, but the reduction is via removal and off-site disposal, which may not necessarily include treatment. Alternative S-3 also provides a significant reduction in toxicity, mobility, and volume of contamination at the facility, but again through removal, and to a lesser extent than Alternative S-2. This alternative would result in a reduction of toxicity and mobility (a reduction in volume due to the SVE system would potentially be offset by an increase in volume through solidification). Alternatives S-5 employs a treatment (*i.e.* LTTD) that would reduce the volume of contaminated soil; however, this treatment is not necessarily destructive, resulting only in the transfer of contaminants from one media to a lesser volume of another media. Alternative S-1 provides no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness: Alternative S-1 would pose no risk to workers or the community during implementation, since no remedial activities would be performed. Alternative S-4 would pose low risks to workers, since the *in situ* treatments associated with this alternative would cause substantially less disturbance of contaminated soils than Alternatives S-2, S-3, and S-5. However, Alternative S-4 would generate volatile emissions which would need to be controlled to protect workers and the community. Alternatives S-2, S-3, and S-5 would require excavation of contaminated soil, with potential volatile and dust emissions that would need to be controlled to protect workers and the community.

Implementability:

Technical Feasibility

Alternative S-1 is the easiest alternative to implement, since no remedial activities would take place. Alternatives S-2, S-3, S-4, and S-5 would employ conventional technologies that are readily available from multiple vendors. Should additional remedial activities be deemed necessary in the future, Alternative S-2 would best facilitate such activities, since only engineering controls would potentially need to be disturbed and replaced; all of the other alternatives could potentially require disturbance and replacement of the multi-layer cap.

Administrative Feasibility
All of the alternatives would leave contamination at the property, thus all of the alternatives would require institutional controls, five-year reviews, and coordination with state and local authorities for making decisions with regard to additional remedial activities.

Availability of Services and Materials
Alternative S-1 would not require any services or material. Alternatives S-2, S-3, S-4, and S-5 would require common construction services and materials for implementation of the remedies, as well as operation and maintenance (O&M) services for the cap and/or engineering controls.

Cost: There would be no capital or O&M costs associated with Alternative S-1. The remaining alternatives have net present worth costs ranging from $36,000,000 to $114,000,000, increasing in the following order: S-4, S-5, S-3, and S-2.

Comparative Analysis of Alternatives for Buildings

Overall Protection of Human Health and the Environment: Alternative B-3 would be the most protective of human health and the environment, since the contaminated buildings would be demolished, and the debris removed and disposed of off-site. B-2 would also be protective, allowing for the continued use of the buildings; however, there is the potential for the encapsulation to fail and exposure routes to be re-established. Alternative B-1 would not be protective.

Compliance with ARARs: Alternatives B-2 and B-3 would be performed in accordance with location- and action-specific ARARs. These alternatives would also comply with contaminant-specific ARARs. Alternative B-1 would not satisfy ARARs.

The Spicer Manufacturing Corporation began construction on the site about 1912. It was within this industrial complex that the universal joint was manufactured and improved, making way for automatic transmissions to be developed in the modem automobile. Therefore, some of the structures extant at Cornell-Dubilier have the potential to qualify as historic properties under Criterion A (properties that are associated with events that have made a significant contribution to the broad patterns of our history); or Criterion B (properties that are associated with the lives of persons significant in our past). If structures on-site are determined to qualify as historic properties, and if the project will affect the structures, it will be necessary to develop a MOA by EPA that will include an agreed-upon approach to resolution of effects, or mitigation of effects. It is expected that such an approach would involve performing additional historical research and recordation of the structures.

Long-Term Effectiveness: Alternative B-3 provides the highest long-term effectiveness, since contaminants are removed from the property, and there is no future risk of exposure. Alternative B-2 would also be effective; however, since contaminants are encapsulated and left on-site, there is the potential for the encapsulation to fail and exposure routes to be re-established. Alternative B-1 is the least effective, since it provides no long-term engineering or operational controls to prevent exposures to contaminants.

Reduction of Toxicity, Mobility or Volume Through Treatment: Alternative B-3 provides the greatest reduction in toxicity, mobility and volume of contamination on the property, but the reduction is via removal and off-site disposal of contaminated building debris from the property, not by treatment. Alternative B-2 also provides a significant reduction in mobility of contamination at the property through decontamination and encapsulation; some residual contamination would remain under this alternative, but it would be encapsulated. Alternative B-1 provides no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness: Alternative B-1 would pose no risk to workers or the community during implementation, since no remedial activities would be performed. Alternatives B-2 and B-3 would pose potential risks to workers and the local community from contaminated dust generated during decontamination and demolition activities, respectively. Alternative B-3 would also cause an increase in truck traffic as a result of the transportation of contaminated building debris.

Implementability:

Technical Feasibility
Alternative B-1 is the easiest alternative to implement, since no remedial activities would take place. Alternatives B-2 and B-3 both employ conventional technologies that are readily available from multiple vendors. For Alternative B-2, should the encapsulation fail, re-encapsulation of the surfaces would be possible. Alternative B-2 would require long-term monitoring, which would not be required under Alternative B-3.

Administrative Feasibility
Alternative B-3 would require coordination with local authorities for transportation of the large quantity of building debris that would be generated; however, no long-term administrative requirements would be associated with this alternative. Alternatives B-1 and B-2 would leave contamination in the buildings above applicable cleanup requirements. Alternative B-2 would require institutional controls to notify future owners and operators of site conditions and prohibit future unrestricted use of the building.

Availability of Services and Materials
Alternative B-1 would not require any services or material. Alternatives B-2 and B-2 would both require common construction services and materials for implementation of the remedies. Alternative B-2 would also require long-term monitoring and O&M services for the encapsulated contamination.

Cost: There would be no capital or O&M costs associated with Alternative B-1. Alternative B-2 has a present worth cost of $18,000,000. Alternative B-3 has a present worth cost of $7,000,000.

EPA has developed cost estimates for business relocation activities under Alternatives B-2 and B-3. The estimated cost of relocating the business for each alternative is $1.2 million. This cost is reflected in the present worth costs above.

400102

SECTION 1.0

1.0 INTRODUCTION

This Feasibility Study Report for Operable Unit 2 (OU-2), Facility Soils and Buildings, of the Cornell-Dubilier Electronics Superfund site (the site), located in Middlesex County, New Jersey, has been prepared by Tetra Tech FW, Inc. (TtFW) in response to Work Assignments 018-RICO-02GZ and 118-RICO-02GZ, issued under United States Environmental Protection Agency (EPA) RAC II Contract Number 68-W-98-214. This report summarizes the evaluation procedure and results of the feasibility study (FS) performed for the facility soils and buildings. This FS was conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (CERCLA), 42 U.S.C. §9601 *et seq.*, TtFW's EPA-approved Final Work Plan (TtFW, 2000a), and current EPA guidance.

The overall FS for the site was separated into three operable units (OUs): residential, commercial, and municipal properties in the vicinity of the former Cornell-Dubilier Electronics facility (OU-1), the facility soils and buildings (OU-2), and the groundwater and Bound Brook corridor (OU-3). This report focuses on the facility soils and buildings (OU-2). The results of the residential, commercial, and municipal properties investigation (OU-1) were addressed in the OU-1 Feasibility Study Report (TtFW, 2001). The results of the groundwater and Bound Brook corridor investigations (OU-3) will be addressed in the OU-3 Feasibility Study Report after additional site investigation activities are performed.

1.1 Purpose and Organization of the Report

The overall objective of the FS for OU-2 was to develop and screen feasible alternatives to remediate the facility soil contamination and contaminated buildings at the facility. Combinations of technologies were assembled into alternatives for remediation of the contamination. The most promising remedial alternatives were then evaluated against seven of the nine EPA evaluation criteria (evaluation against the remaining criteria is done subsequent to issue of the FS Report) and compared to one another. This evaluation provides a basis for the EPA to select the best remedial alternatives and to sign a Record of Decision (ROD) for OU-2. Specifically, the FS objectives were:

- Identification of feasible remedial technologies for containment, removal, or treatment and disposal of contaminated soils and buildings;

- Screening and assembly of the feasible technologies into remedial alternatives for detailed analysis; and

- Detailed evaluation and comparison of the remedial alternatives to provide a basis for EPA to select the best remedial alternative.

This Feasibility Study Report was prepared utilizing the data and information presented in the Remedial Investigation Report for Operable Unit 2 (OU-2), Facility Soils and Buildings (TtFW, 2002) and follows procedures outlined in EPA's *"Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA – Interim Final"* (EPA, 1988a).

This Feasibility Study Report is divided into six sections, Sections 1.0 through 6.0, as follows:

Section 1.0, Introduction, provides background information regarding the site, including summaries of the site description and history, nature and extent of contamination, contaminant fate and transport, and baseline risk assessments.

Section 2.0, Identification and Screening of Technologies, presents the remedial action objectives (RAOs); general response actions (GRAs); feasible technologies identified to meet the GRAs; the technical criteria and the site-specific requirements that were used in the technology selection process; and the results of the remedial technology screening.

Section 3.0, Development and Initial Screening of Alternatives, presents the remedial alternatives that were developed by combining the technologies that passed the screening in Section 2.0. When necessary to reduce the number of alternatives subject to detailed evaluation, a preliminary screening of remedial alternatives is typically presented in this section, including descriptions of the effectiveness, implementability, and cost screening for each alternative. For the facility soils and buildings, the number of feasible alternatives developed was not sufficiently large to require a screening of alternatives, and all developed alternatives were carried forward for detailed analysis.

Section 4.0, Detailed Analysis of Remedial Alternatives, presents a detailed description and evaluation of each of the alternatives identified in Section 3.0. The analysis of each alternative was performed against the first seven of the nine assessment criteria (EPA, 1988a). This section also presents the comparative analysis of alternatives relative to these seven evaluation criteria.

Section 5.0, References, provides a list of the references and previous studies cited in this report.

Section 6.0, Glossary of Abbreviations and Acronyms, presents a list of the acronyms and abbreviations cited throughout the Feasibility Study Report.

The Feasibility Study Report has two appendices (Appendix A and Appendix B). Appendix A identifies the major construction components for the remedial alternatives. Appendix B provides the conceptual estimates of the capital and operation and maintenance costs.

1.2 Site Description and History

1.2.1 Site Location

The site consists of the former Cornell-Dubilier Electronics Corporation, Inc. (Cornell-Dubilier Electronics) facility, contaminated portions of the Bound Brook adjacent to and downstream of the industrial park, and contaminated residential, municipal, and commercial properties in the vicinity of the former Cornell-Dubilier Electronics facility. The former Cornell-Dubilier Electronics facility, also known as the Hamilton Industrial Park, is located at 333 Hamilton Boulevard in South Plainfield, Middlesex County, New Jersey (Latitude 40°34'35.0", Longitude 74°24'51.0"), and consists of approximately 26 acres, containing 18 subdivided buildings that are used by a variety of commercial and industrial tenants (Figures 1-1 and 1-2). The former Cornell-Dubilier Electronics facility is bordered on the northeast by Bound Brook and the former Lehigh Valley Railroad, Perth

Amboy Branch (presently Conrail); to the southeast by the South Plainfield Department of Public Works property, which includes an unnamed tributary to Bound Brook; to the southwest, across Spicer Avenue, by single-family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties.

1.2.2 Physical Characteristics

The developed portion of the facility (*i.e.*, the northwestern area) comprises approximately 45 percent of the land area, and contains the facility buildings, a system of catch basins to channel stormwater flow, and paved roadways. Based on dye testing results, several of the catch basins drain into outfalls along Bound Brook. The northwestern facility area is gently sloping, with elevations ranging from approximately 70 to 82 feet above mean sea level (msl). The remaining 55 percent of the property is predominately vegetated (*i.e.*, undeveloped). The central portion of the facility is primarily an open field, with some wooded areas to the south and a semi-paved area in the fenced area in the middle. This area is relatively level, with elevations ranging from approximately 71 to 76 feet above msl. The property drops steeply to the northeast and southeast, and the eastern portion of the facility consists primarily of wetland areas bordering Bound Brook. Elevations in this area range from approximately 71 feet above msl at the top of the bank to approximately 60 feet above msl along Bound Brook.

The Cornell-Dubilier Electronics site lies within the Piedmont Physiographic Province and is underlain by the late Triassic to early Jurassic Age Brunswick Formation of the Newark Group. At the facility property, the Brunswick Formation bedrock consists of red-brown to purplish-red mudstone and siltstone with localized beds of fine-grained sandstone. The unit contains heavily fractured zones, generally occurring along bedding planes. The top of the consolidated bedrock ranges from 4 to 15 feet below ground surface (bgs), except in the far northwest corner of the facility property, where bedrock was encountered immediately underlying the building slabs.

The overburden on the facility consists of an unconsolidated unit and a weathered bedrock unit. The unconsolidated unit ranges in thickness from 0 to 15 feet, and is thin or absent (beneath building slabs) in the northwest and southwest portions of the facility and thickens toward Bound Brook. Depending on location, the unconsolidated unit consisted of red-brown silt and sand, silt and clay, silt and fine sand, gravel, and/or fill material. A weathered siltstone unit, approximately 1 to 8 feet thick above the bedrock surface, extends beneath most of the facility. This weathered zone is thinnest along the southwestern boundary and thickest in the northern area of the facility. Consisting mainly of red-brown silt to fine sand, with sub-rounded to angular, fine to coarse siltstone gravel and silty clay, this unit interfingers with the urban fill material at a number of locations.

The Brunswick Formation bedrock aquifer is a gently dipping, multi-unit leaky aquifer system that consists of thin water-bearing units separated by thick intervening confining beds. Two types of water-bearing units have been described in this formation: major fractures parallel to the bedding and thin, intensely fractured (both parallel and perpendicular to the bedding) geologic strata.

The saturated conditions encountered during the RI investigation at select locations and the high percentage of silt and clay present in the soils suggest that a seasonally-influenced, discontinuous perched water table exists in the unconsolidated material across parts of the facility. Although not a significant hydrogeologic unit, the perched water table may recharge the underlying bedrock aquifer.

Seven wetlands (four Palustrine Emergent, two Palustrine Emergent/Palustrine Scrub-Shrub, and one Palustrine Forested Broad Leaved Deciduous) were delineated at the facility during the OU-2 RI. Wetland acreage ranged from 0.02 acres to 1.03 acres. Four of the wetlands are located adjacent to Bound Brook, and three are in the southwestern portion of the facility. The remainder of the facility consists of successional fields, broad-leaved deciduous forests, and developed land.

Most of the facility, including the portion containing the buildings and structures, lies outside of the flood hazard area, and the 100- and 500-year floodplains. The southeastern portion; however, is located within the flood hazard area, and the 100- and 500-year floodplains of Bound Brook.

1.2.3 Site History

The Spicer Manufacturing Company established operations at the facility in 1912 (South Plainfield Bicentennial Committee, 1976), and most of the major facility structures were erected by 1918. The company operated a manufacturing plant on the property from 1912 through the mid- to late-1920s. The plant manufactured universal joints and drive shafts, clutches, drop forgings, sheet metal stampings, screw products, and coil springs for the automobile industry. The plant included a machine shop, a box shop, a lumber shop, a scrap shop, a heat treating building, a transformer platform, a forge shop, a shear shed, a boiler room, an acid pickle building, and a die sinking shop. A chemical laboratory for the analysis of steel was added in 1917. When the Spicer Manufacturing Company ceased operations at the facility, the property was improved with buildings containing approximately 210,000 square feet of space.

Cornell-Dubilier Electronics operated at the facility from 1936 to 1962, manufacturing electronic components including capacitors. It has been reported that the company also tested transformer oils for an unknown period of time. Polychlorinated biphenyls (PCBs) and chlorinated organic degreasing solvents were used in the manufacturing process, and it has been alleged that during Cornell-Dubilier Electronics' period of operation, the company disposed of PCB-contaminated materials and other hazardous substances at the facility. A former employee has claimed that the rear of the property was saturated with transformer oils and that capacitors were also buried behind the facility during the same time period (EPA, 1996).

The PCB-containing capacitors were manufactured by winding together thin sheets of aluminum foil and paper (Foley, Hoag & Eliot, 1988; 1996). This bundle was then wrapped in insulation and placed inside a canister. The canister unit was sealed, except for small fill holes through which dielectric material was to be introduced. The capacitors underwent initial testing, and if working properly, were subsequently placed in an impregnation tank. Here the capacitors were evacuated and filled with Aroclor-1254, with some capacitors also being impregnated with vegetable oil, mineral oil, or boric acid. The fill holes were sealed, and the entire unit was then placed in a degreasing unit. The degreasing agent utilized was trichloroethene (TCE). Excess Aroclor was drained through a closed filtration system linked to the impregnation tanks, and the filter medium used was diatomaceous material known as "fuller's earth."

400107

The capacitors which failed to meet specifications were drained of Aroclor-1254, and if the canister and/or capacitor parts could not be reused, these materials may have been disposed of on the facility (Foley, Hoag & Eliot; 1988; 1996). The diatomaceous material used in the filtering process and any residue that had accumulated on the interior of the degreasing units may also have been disposed of at the facility. Small accidental leaks or spills of Aroclor occurred occasionally in the factory; these spills likely were dealt with through gutters along the edges of work benches to contain the spills or cleaned by spreading an absorbent substance, such as fuller's earth, on the spill.

Since Cornell-Dubilier Electronic's departure from the facility in June 1962, the facility has been operated by its owners as a rental property with numerous tenants occupying the buildings and warehouses.

1.2.4 Previous Investigations

The following is a brief chronological summary of investigations related to soils and buildings at the facility conducted prior to the RI.

- 4 January 1985 – New Jersey Department of Environmental Protection (NJDEP) personnel visited the facility and noted in the *Preliminary Assessment Report* that a portion of the lot located in the back of the facility contained a black soil unnatural to the area (EPA, 1995). In addition, NJDEP personnel noted that four large black tanks were present on the edge of a large filled-in area near the rear of the facility. The tanks were at the top of an embankment leading down to Bound Brook.

- 11 September 1986 – NJDEP conducted a Site Inspection and collected three surface soil, two surface water, and two sediment samples at the facility. Exact sample locations are not available. Several metals, volatile organic compounds (VOCs), and Aroclor-1254 were detected in the soil and sediment samples. Information on the investigation is presented in the *Site Inspection Report*, dated 12 September 1986, and the *Data Validation Review Memorandum*, dated 13 April 1987 (EPA, 1995).

- March to July 1990 – NJDEP investigated an oil and water mixture that was leaching into a pit in the basement of Building No. 15. D.S.C. of Newark Enterprises, Inc., the owner of the facility, dug 14 test holes in the vicinity of the building, between the building and a 125,000-gallon aboveground oil tank, and in the vicinity of two former 8,000-gallon and one former 11,000-gallon aboveground oil tanks (DSC, 1990a; 1990b). Oil was present on the water in seven locations, of which five were along the piping from the present oil tank to the building, one was in the former tank area, and one was between the former tank area and the present tank piping. The two test holes dug closest to the 125,000-gallon tank did not indicate floating oil.

- 30 March 1994 – Five tanks were observed in the northeast embankment area during an EPA Site Inspection Prioritization (SIP) reconnaissance visit (EPA, 1995). However, the "black soil" previously reported by NJDEP was not visible during this inspection. Two small soil piles, covered with plastic, were observed in front of Building No. 14. The boiler system had

400108

leaked heating oil onto the soil in the vicinity of Building No. 18, and the piles contained the excavated soil.

- 8 June 1994 – EPA collected six surface soil samples from the facility during a SIP sampling event. Results of the sampling are summarized in the *Site Inspection Prioritization Evaluation Report*, dated 23 January 1995 (EPA, 1995). VOCs, semi-volatile organic compounds (SVOCs), Aroclor-1254, and various metals were detected in soils at concentrations significantly exceeding background levels.

- 29 February 1996 – EPA collected four additional surface soil samples (and a duplicate sample) from the facility. Aroclor-1254 was detected at concentrations up to 77 mg/kg in the soils, as described in the *Hazard Ranking System Documentation Report*, dated December 1996 (EPA, 1996a). During this Hazard Ranking System (HRS) sampling event, it was noted that the tanks were no longer present on the edge of the northeast embankment.

- 23 April 1996 – EPA collected four air samples, one from each of the four perimeter sides of an area in the center of the open portion of the facility that was then being used by a truck driving school. During the sampling, visible dust was noted with the winds out of the west to northwest at approximately 10 to 20 miles per hour (mph). The samples were analyzed for PCBs, lead, cadmium, silver, and arsenic. No PCBs were present at a detection limit of 3.3 micrograms per cubic meter (ug/m^3). Lead was detected in two of the air samples, at concentrations of 3.5 ug/m^3 and 7.2 ug/m^3, with the higher concentration present in the background upwind sample location.

- 27 and 29 June 1996 – EPA collected surface and subsurface soil samples from the facility roadway, the vacant open field area, a foot/bicycle path that crossed the facility, and the southeastern and eastern floodplain areas. Two depth intervals were sampled, 0 to 3 inches and 3 to 12 inches below ground surface (bgs) (3 to 18 inches bgs for the roadway only). Aroclor-1254 was detected in facility surface soils at concentrations as high as 51,000 mg/kg from the field area and at 100 mg/kg in a sample from the floodplain of Bound Brook. Concentrations of Aroclor-1254 ranged up to 5,000 mg/kg in the surface soils along the foot/bicycle path. Lead concentrations ranging from 1,740 mg/kg to 66,600 mg/kg were measured in surface soil samples collected near the foot/bicycle path and the northeast corner of the fenced area, within the area where exposed waste materials were located. Aroclor-1254 was present in the soils at the surface and beneath the gravel/stone layer of the roadway, up to 340 mg/kg and 22,000 mg/kg, respectively. Lead was detected on the surface of the facility roadway at concentrations as high as 340 mg/kg, and beneath the gravel/stone layer at concentrations as high as 7,460 mg/kg.

- 16 July 1996 – Six test pits were excavated in the vacant open field area, and 18 soil samples were collected. The test pits revealed stained subsurface soils, drum carcasses, electrical parts, paper-thin mica-like chips, wood, and debris. Aroclor-1254 and lead were detected at concentrations as high as 1,900 mg/kg and 1,970 mg/kg, respectively. Water was present in Test Pit No. 1 at a depth of 4.5 feet bgs; the remainder of the test pits revealed some water infiltration between 7 and 9 feet bgs.

- 21 March 1997 – EPA conducted wipe sampling in 12 buildings located at the former facility. Aroclor-1254, Aroclor-1260, lead, and cadmium contamination were identified on building surfaces. The results for the 27 samples are presented in the *Final Report, Wipe Sampling*, dated May 1997 (Weston, 1997a).

- 5 and 9 June 1997 – EPA conducted chip, air, and vacuum dust sampling of two building interiors at the facility, with additional air samples also being collected at "trucking fenceline" and "roadway corner, trucking facility." Concentrations of Aroclor-1248 and Aroclor-1254 as high as 31,000 mg/kg and 57,000 mg/kg, respectively, were measured in the chip samples. The dust and chip samples also indicated lead (maximum concentration of 3,800 mg/kg) and cadmium (maximum concentration of 130 mg/kg). Detected concentrations in the air samples ranged up to 33 ug/m^3 for PCBs, 0.971 ug/m^3 for lead and 0.054 ug/m^3 for cadmium. The *Trip Report* (23 June 1997) and *Analytical Report* (August 1997) summarize the results of the building investigation (Weston, 1997b; 1997c).

The overall results of the above sampling and analyses indicate elevated concentrations of VOCs, SVOCs, PCBs, and metals in the soils. Building interiors at the facility were found to contain elevated levels of PCBs and metals.

1.2.5 Previous Remedial Activities

To date, the following actions have been taken to reduce the potential for exposure to site contaminants and limit the migration of contaminants from the facility:

- 25 March 1997 – A unilateral administrative order was issued to the current owner of the Hamilton Industrial Park, D.S.C. of Newark Enterprises Inc., which required that a removal action be taken to stabilize the facility. The scope of work included paving facility driveways and parking areas, installing security fencing and warning signs to limit access to the facility, and installing silt fencing to limit migration of surface soils off the facility.

- 7 April 1997 – EPA installed temporary fencing and posted warning signs at both ends of the footpath that crossed the eastern portion of the facility to block pedestrian access. In addition, EPA personnel overpacked several large capacitors that were leaking oil.

1.2.6 Current Site Conditions

Currently, facility land use is commercial/light industrial. The Hamilton Industrial Park is located in the western portion of the former Cornell-Dubilier Electronics facility and is largely paved or occupied by buildings. All areas used as driveways, parking areas and walkways were paved by the property owner pursuant to the administrative order issued by the EPA in March 1997. Site control measures, including the installation of a six-foot chain-link fence, posting of warning signs, and implementing engineering controls to limit the migration of contaminants through surface water run-off, were also implemented pursuant to this order. It is anticipated that future land use for the facility will remain commercial and/or light industrial.

1.3 Remedial Investigation Summary

The purpose of the OU-2 RI was to characterize the nature and extent of contamination associated with the facility. To accomplish this, Foster Wheeler Environmental's field investigation program was divided into two major phases: Site Reconnaissance and Phase I Environmental Sampling. The work performed by Foster Wheeler Environmental during these investigation phases followed the procedures provided in the EPA-approved Final Work Plan, Final Field Sampling Plan, and Final Quality Assurance Project Plan (TtFW, 2000a; 2000b; 2000c), with minor modifications that were discussed with, and approved by, EPA prior to implementation.

The OU-2 Site Reconnaissance focused on defining the boundaries of the dump/fill area in the center portion of the facility and locating potential source areas. Tasks performed during this phase of work included an historical information review, geophysical survey, a soil gas survey, a drainage system survey, test pit excavations, building floor dust sampling, and an ecological resources investigation.

The Phase I investigation for OU-2 focused on determining local geologic conditions, delineating potential source areas, and characterizing site contaminants. Tasks performed during this phase of work included the drilling of soil borings and the sampling of shallow and subsurface soils, perched water, and drainage system water and sediment.

1.3.1 Nature and Extent of Contamination

The nature and extent of contamination for the facility soils and buildings was assessed as part of the OU-2 remedial investigation. Screening criteria were used to assist in the interpretation of the nature and extent of contamination. These criteria include Applicable or Relevant and Appropriate Requirements (ARARs), *i.e.,* standards promulgated under federal or state law, and "to be considered" (TBC) guidance values, which are not promulgated. The specific screening criteria that were used for comparison for shallow/subsurface soil, perched water and drainage system constituents are discussed in the OU-2 Remedial Investigation Report (TtFW, 2002), and are summarized on Tables 1-1 through 1-4. No applicable screening criteria exist for floor dust samples collected during the investigation; therefore, the shallow soil screening criteria were utilized as an approximate comparison. For all matrices, when there was more than one criterion value for a specific constituent, the most conservative value (*i.e.*, the lowest) was utilized during the evaluation.

1.3.1.1 Historical Information Review

An evaluation of available historical information was performed to determine potential contaminant source areas. Aerial photographs dating from the 1940s to the 1990s were reviewed in order to acquire a representative understanding of the facility development. Attention was specifically paid to discolored areas, tank-like objects, potential debris piles, etc. In addition, a 1956 insurance map of the western portion of the facility was examined (FIA, 1956), as were various documents obtained from the current property owner (DSC, 1990a; 1990b). Figure 1-3 presents the possible source areas for the facility determined from the available historical information.

400111

1.3.1.2 Geophysical Survey

A geophysical survey was conducted from 4 May to 11 May 2000, generally in the central portion of the facility. The geophysical data were interpreted by assessing the signal intensity and shape of the measurements from the electromagnetic induction (EMI) and magnetic datasets. Areas which generally showed the greatest signal intensity and were identified as potential source areas are presented on Figure 1-4.

The geophysical results indicated that the amount of buried material decreases toward the south and east of the survey area. In the southwestern section of the survey area, the geophysical data suggest that the debris is widely scattered and shallow (*i.e.*, less than 3 feet deep). The eastern border of the survey area is characterized by increased subsurface debris; however, the largest amount of material exists within the central, western and northern sections of the geophysical survey area.

From the northeastern portion of the former truck driving school area (*i.e.*, in the central section of the survey) to the embankment leading to Bound Brook, the geophysical data suggest that there is an increased metallic component to the shallow buried material. As shown on Figure 1-4, this area trends approximately east-west and is approximately 300 feet in length and up to 140 feet in width. Based on the geophysical survey results, test pits TP02, TP08 and TP09 were located in the eastern, western and southwestern portions of this anomalous area, respectively. Excavation of these test pits confirmed the geophysical interpretation (further discussed in Section 1.3.1.4).

Smaller anomalous areas were noted in the northern and western portions of the survey area. The data suggest that there is more mixed material (*i.e.*, metallic and non-metallic) waste in these areas when compared to the eastern one.

1.3.1.3 Soil Gas Survey

The main contaminant of concern detected during the soil gas survey was TCE. TCE was present across most of the interior of the facility, along with several of its chlorinated breakdown products. As shown in Figure 1-4, four areas of elevated chlorinated hydrocarbon occurrences (*i.e.*, sum total greater than 100 ug/L) were noted, including near the northeastern corner of the former truck driving school fence; in the vicinity of the southwestern corner of the former truck driving school fence; to the southwest of Building No. 12; and to the northeast of Building No. 11.

Non-chlorinated VOC compounds detected during the soil gas survey, including a presence of "FID Total Volatiles," were more scattered around the facility. As shown on Figure 1-4, possible areas of concern for the non-chlorinated VOCs included the following:

- Northern portion of the facility, between Building Nos. 1B and 2;
- East of Building No. 9B;
- Southeast of Building Nos. 11 and 12, near the former fuel tank area;
- Southwest of Building No. 12;
- Southwest of Test Pit TP06;
- South-southeast of Building No. 14, near the facility's northeastern fenceline; and
- Southern portion of former truck driving school area (central section of survey), near TP09.

The areas with elevated soil gas concentrations were typically investigated further during the test pit excavations, monitoring well boring activities, and building soil boring activities.

1.3.1.4 Test Pit Excavations

Ten test pits were excavated within the central portion of the facility between 7 June and 14 June 2000 (see Figure 1-4). Various types of debris were noted during the excavations, and full descriptions of the test pit contents are presented on the Test Pit Records provided in the Remedial Investigation Report for OU-2 (TtFW, 2002). The results from the soil and perched water samples collected from the test pits are discussed in Section 1.3.1.6.

General construction/demolition debris, such as bricks, wood, concrete, etc., was present in a majority of the test pit locations. TP01, located in the east-northeastern portion of the facility along the embankment, contained scrap metal, automobile parts, and steel cable. Miscellaneous metallic debris was also excavated from TP02, including sheet metal, steel blocks, and metal buckets. In addition, test pit TP02 was found to contain ceramic electrical parts and drum components.

Capacitors, denoted as "electrical boxes" on the Test Pit Records, were unearthed during excavation of locations TP06, TP08, and TP09. As shown on Figure 1-4, these three test pits were located in anomalous areas from the geophysical survey, confirming the geophysical interpretation of buried metallic material. Further inspection of the TP08 and TP09 capacitors, performed by EPA and TtFW personnel after test pit removal, revealed that some of the capacitor boxes appeared corroded and/or partially burned. Other indications of disposal in these areas were the presence of white and blue crystalline powder (TP08 and TP10), "mica-like" and "battery-shaped" pieces of material (TP08), 2-inch long white cylindrical objects (TP09), 5-inch diameter cardboard disks (TP09), and ceramic electrical components (TP09).

In comparison to the other excavations, debris was not noted in test pits TP04 and TP05. TP04 contained dark brown ash-like material within the upper 3 feet. Additionally, a pocket of light gray ash-like material, approximately 3 feet wide and up to 1 foot thick, was observed in the western portion of the test pit. Gravel layers were found in TP05, with light gray gravel present from approximately 0.5 to 2 feet bgs and dark gray gravel present from approximately 2 to 3 feet bgs on the northern side of the test pit and almost non-existent on the southern end. An oily water seep appeared within this dark gray gravel layer, approximately 3 feet from the northern end of TP05.

1.3.1.5 Building Floor Dust Investigation

Thirty-two building floor dust samples, plus two duplicate samples, were collected in the facility buildings during the RI field activities, and analyzed for TCL PCBs and TAL metals. Figures 1-5 through 1-10 present relative ranges of concentrations (*i.e.*, not risk or screening level based values) for select constituents.

Aroclor-1254 was detected in all of the floor dust samples collected, and concentrations ranged from 4.9 mg/kg in a sample from Building No. 3/4 to 8,300 mg/kg in a sample from Building No. 1. As indicated in Figure 1-5, the more elevated concentrations of Aroclor-1254 (*i.e.*, greater than 500 mg/kg) were present in Building Nos. 1, 1B, 5, and 6. A majority of these high concentration samples were collected from bare floors in warehouse or production areas of the buildings.

With the exceptions of selenium and thallium, all of the TAL metals were detected in at least one of the samples collected from each of the facility buildings. Selenium and thallium were present in 19 and 12 leasable spaces, respectively. A discernible, consistent concentration pattern was not generally present for the detected metals. Elevated concentrations varied across the locations, with maximum metal values present in 14 different building spaces. Typically, the floor dust samples from Building Nos. 1, 2A, 5, 9, 9C, 14, and/or 15 contained numerous metals (*e.g.*, arsenic, lead, mercury) at higher concentrations (although not necessarily the maximum value for a specific individual metal). With the exceptions of samples BFD01-01 and BFD15-01, which were collected from carpeted floors, these buildings had bare floors. To illustrate the varying distributions of metals, concentrations for five potential contaminants of concern (arsenic, cadmium, chromium, lead, and mercury) were mapped on Figures 1-6 through 1-10.

1.3.1.6 Soils Investigation

To investigate the potential source areas and determine the extent of soil contamination for the facility, various sampling events occurred during the field investigation. The results of these investigations were separated into shallow (*i.e.*, 0 to 2 feet below ground surface/cover) and subsurface (*i.e.*, greater than 2 feet below ground surface/cover) soils. For the monitoring well boring samples collected under asphalt, the sampling interval depth was based on the bottom of the surface covering (*i.e.*, if the asphalt layer was 0.5 feet thick, the shallow sample was collected from 0.5 to 2 feet). For the building boring soil investigation, the samples were collected beginning at the bottom of the concrete or asphalt layer and then continuing up to 2 feet in depth, depending on refusal (*i.e.*, if the concrete layer was 0.5 feet thick, the building boring soil samples were collected from 0.5 to 1.5 feet and from 1.5 to 2.5 feet). Only those building boring soil samples collected less than 2 feet in depth from the bottom of the surface covering were included in the shallow soil results. The facility was divided into six general areas for ease of discussion, as follows: northern developed portion, southern developed portion, southwestern undeveloped portion, central undeveloped portion, northeastern undeveloped portion, and floodplain undeveloped portion (Figure 1-11).

1.3.1.6.1 Shallow Soils

A total of 96 samples (and 6 duplicate samples) were collected from the 0 to 2-foot interval across the facility. Exceedances of the most conservative screening criteria values are presented on Figure 1-12 by sample location. The following paragraphs summarize the major findings, by contaminant types.

Polychlorinated Biphenyls

PCBs were present in the shallow soils across the entire facility. Only six of the samples contained non-detectable levels of these compounds (*i.e.*, a frequency of detection of approximately 0.94), and all of these locations were in the northern developed area. With the exceptions of Aroclor-1242 and Aroclor-1260, the northern developed and the southwestern undeveloped portions generally had lower concentrations of PCBs than the other four sampled areas. Aroclor-1242 was present just in the northern and southern developed portions. Aroclor-1260 was detected in the shallow soils of only the northern developed and southwestern undeveloped portions of the facility. However, all six areas contained concentrations of both individual Aroclor constituents and Total PCBs exceeding screening criteria by factors ranging from 1.1 to 51,000.

The shallow soil from two sample locations in the floodplain undeveloped portion, SS02 and SS03, underwent analysis for PCB congeners; details are provided in Table 4-9 of the OU-2 Remedial Investigation Report (TtFW, 2002). Of the 94 congener compounds or compound combinations analyzed by the off-site laboratory, 61 were present in the shallow soils. Location SS02 contained congener concentrations ranging from 0.65 ug/kg to 49 ug/kg, with a total PCB congener concentration of 460 ug/kg. Congeners were generally present at more elevated levels (*i.e.*, between 81 ug/kg and 6,000 ug/kg) in the shallow soils from SS03. Total PCB congeners in this sample summed to 53,000 ug/kg.

Dioxins/Furans

Due to the presence of charred debris in the test pits and the fact that burning PCBs can result in the generation of dioxins/furans, a limited set of soil samples were subjected to dioxins and furans analysis. Three shallow soil samples (SS02, SS03, and MW09) were analyzed for dioxins and furans, and all three of the locations contained detectable concentrations of these compounds. Concentrations were generally lowest in SS02 (floodplain undeveloped portion) and highest in MW09 (central undeveloped portion). Individual dioxin/furan constituents ranged up to 173 picograms per gram (pg/g) in SS02, up to 2,520 pg/g in SS03, and up to 13,510 pg/g in MW09. The maximum concentrations for the dioxin/furan homologs (*i.e.*, compounds with an equal number of chlorine substitutions) were 4,430 pg/g (SS02); 14,420 pg/g (SS03); and 52,850 pg/g (MW09). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) is the only constituent in this class of compounds with a screening criterion (*i.e.*, 3.15 pg/g). 2,3,7,8-TCDD was detected in the shallow soils from both SS03 (10.1 pg/g) and MW09 (56.7 pg/g) at concentrations above this value.

Volatile Organic Compounds

A total of 30 individual VOCs were detected in the shallow soils, and a majority of these constituents (*i.e.*, 23 of the 30; or 77 percent) were present at concentrations less than their respective screening criteria values. In addition, the VOCs were relatively infrequently detected (*i.e.*, 26 VOCs had frequencies of detection less than 0.20; or 87 percent); exceptions included cis-1,2-DCE (0.26), acetone (0.35), toluene (0.50), and TCE (0.59). Seven VOC compounds (cis-1,2-DCE, trans-1,2-DCE, 1,2,4-trichlorobenzene, methylene chloride, PCE, TCE, and vinyl chloride) occurred above screening criteria. As indicated on Figure 1-12, the only exceedance concentration of 1,2,4-trichlorobenzene (5,900 ug/kg) was detected in test pit TP10, and methylene chloride was present above its screening criterion only in shallow soil location SS04 (1,700 ug/kg). The more elevated concentrations of the other VOCs exceeding screening criteria were present in the southern developed (MW06/BSB61), central undeveloped (TP10/MW11) and/or floodplain (SS04) portions of the facility (Figure 1-12).

400115

Semi-Volatile Organic Compounds

Thirty-two SVOC compounds were detected within the shallow soil samples collected during the OU-2 RI sampling. Frequencies of detection ranged from 0.01 (2-chloronaphthalene, caprolactam, and hexachlorobenzene) to 0.69 (fluoranthene, phenanthrene, and pyrene). In general, two classes of semi-volatile constituents - phthalate compounds and PAH compounds - constituted a majority of the occurrences. Thirteen individual PAH compounds, biphenyl and carbazole had concentrations greater than their respective shallow soil screening criteria values. As shown on Figure 1-12, the more elevated concentrations and the higher number of exceeding compounds occurred for the southern developed portion (MW06/BSB55) and the southwestern undeveloped portion (SS09). The "hot spot" in the middle of the southern developed portion partially coincides with the elevated non-chlorinated soil gas results (see Figure 1-4). The sample collected from SS09, in the location of the second, smaller "hot spot," had the appearance of semi-dried tar with a discernible petroleum-based odor, and this likely accounts for the elevated amounts of PAHs. In addition, this part of the southwestern undeveloped portion appeared to contain debris and other objects during review of the aerial photographs.

Pesticides

Nineteen pesticides were detected across the facility during the shallow soil investigation. The northern developed and southern developed portions had the highest number of constituents (*i.e.*, 18 and 16 pesticides, respectively). Of the 19 detected pesticides, 12 were present at concentrations above screening criteria, and as indicated on Figure 1-12, exceedances were found in all portions of the facility. The distribution of concentrations for a majority of the pesticides was similar, with the more elevated concentrations typically appearing in the following areas: boundary of the northeastern undeveloped portion and the floodplain undeveloped portion (SS03/SS05/MW05), eastern corner of the central undeveloped portion (MW09), western corner of the central undeveloped portion (MW11/TP10), southern corner of the southern developed portion near Building Nos. 11 and 12 (BSB56/BSB57/BSB59/BSB60/BSB61), and/or the northern corner of the northern developed portion in Building No. 1 (BSB02/BSB03). Additional elevated concentrations were noted for specific pesticides, such as aldrin in MW06 (55,000 ug/kg), endrin in BSB41 (26,000 ug/kg in the sample from between the concrete layers), and heptachlor in BSB24 (32,000 ug/kg).

Metals and Cyanide

The shallow soils contained detectable concentrations of 23 metals and cyanide, and as shown on Figure 1-12, most of the metals with available screening criteria exceeded their respective values across the entire facility. Cyanide was not detected above its screening criterion value. A majority of the maximum concentrations for the inorganic constituents (*i.e.*, 18 of 24, or 75 percent) was present on the developed portion.

The undeveloped portion of the facility also showed exceedances for many metals; locations for these elevated concentrations were generally dependent on the particular metal constituent contoured. For example, both arsenic and cadmium had a "hot spot" within the central undeveloped portion, near MW11. Chromium, although also present at a relatively high concentration near MW11, was even more elevated in the floodplain soils of SS01, SS03, and SS04. Lead, in comparison, was present in the eastern corner of the facility, from the northwest corner of the central undeveloped portion (RA-S5-SS5) to the northeastern undeveloped portion (MW05), and within the floodplain undeveloped portion (RA-S6-SS6).

1.3.1.6.2 Subsurface Soils

A total of 59 samples (and 3 duplicate samples) were collected from greater than 2 feet bgs to 14 feet bgs; no samples of the subsurface soils were collected in the floodplain undeveloped portion of the facility. Exceedances of the most conservative screening criteria values (for at least the maximum value per concentration range) are presented, by sample location, on Figures 1-13 (2-6 feet bgs) and 1-14 (6-14 feet bgs). The findings are presented in the following paragraphs.

Polychlorinated Biphenyls

PCBs were detected throughout the subsurface soils of the facility, at detection frequencies up to approximately 0.90. Only six of the 59 samples did not contain a detectable amount of any individual Aroclor constituent, and these samples were located in the northern developed area (five samples) or the southwestern undeveloped area (one sample). With the exception of the southwestern undeveloped area, all of the sampled areas contained concentrations of both individual Aroclors and Total PCBs exceeding screening criteria, by factors up to approximately 265,000.

Three subsurface soil samples (4 to 6 feet bgs from MW04, 8 to 10 feet bgs from MW09, and 4 to 6 feet bgs for MW11) underwent PCB congener analysis; details are provided in Table 4-10 of the OU-2 Remedial Investigation Report (TtFW, 2002). Of the 94 congener compounds or compound combinations analyzed by the off-site laboratory, 65 and 72 constituents were present in the subsurface soils from the southern developed (MW04) and central undeveloped (MW09/MW11) portions, respectively. The 4 to 6-foot soils from MW04 contained congener concentrations between 0.95 ug/kg and 77 ug/kg, with a total PCB congener concentration of 770 ug/kg. Congeners were generally present at concentrations at least an order of magnitude higher in the MW09 soils (i.e., from 16 ug/kg to 1,800 ug/kg for the individual compounds or compound combinations, and 15,000 ug/kg for the total). The most elevated concentrations, though, were present in the 4 to 6-foot soils collected from MW11. This sample contained PCB congener compounds or compound concentrations up to 2,200,000 ug/kg (BZ 110/77). Total PCB congeners in the MW11 sample summed to 39,000,000 ug/kg.

Dioxins/Furans

None of the subsurface soil samples were analyzed for dioxin and furan compounds during the OU-2 RI investigation.

Volatile Organic Compounds

The subsurface soils contained 32 identifiable VOCs, and frequencies of detection for seven VOCs were greater than 0.20, as follows: trichlorofluoromethane at 0.22; xylenes at 0.24; 1,1,1-trichloroethane (TCA) at 0.27; cis-1,2-DCE at 0.32; acetone at 0.37; toluene at 0.37; and TCE at 0.53. The remaining constituents had detection frequencies ranging between 0.02 and 0.20. Twentyfour of the VOC constituents were present at concentrations less than their respective screening criteria. Eight VOC compounds (1,2-dichloropropane; 1,1-DCE; cis-1,2-DCE, 1,2,4-trichlorobenzene, methylene chloride, PCE, TCE, and vinyl chloride) occurred above screening criteria; see Figures 1-13 and 1-14. Six of these eight VOCs were also detected at concentrations greater than screening criteria values in the surface soil. A majority of the exceedances, and those with the most elevated concentrations, were present in the southern developed (MW04/MW06/MW12/TP04/TP05) and/or central undeveloped (MW11/TP06/TP08) portions of the facility (Figures 1-13 and 1-14). In addition, one occurrence each for methylene chloride (21 ug/kg) and TCE (110 ug/kg) in the northern developed portion exceeded screening criteria, along with one occurrence for TCE (220 ug/kg) in the northeastern undeveloped portion.

Semi-Volatile Organic Compounds

A total of 29 individual SVOCs were detected during the subsurface soil investigation. A majority of these constituents (*i.e.,* 22; or 76 percent) are PAH, phthalate or phenolic compounds. Frequencies of detection in the subsurface soils ranged between 0.02 (2,4-dimethylphenol, 2-chloronaphthalene, butyl benzyl phthalate, diethyl phthalate, pentachlorophenol, and phenol) and 0.37 (pyrene). The subsurface soils contained exceedance concentrations of 12 SVOCs (mostly PAHs), as shown on Figures 1-13 and 1-14. With the exceptions of nine relatively low concentration exceedances (i.e., less than 425 ug/kg) of benzo(a)pyrene, the SVOC concentrations that were greater than their respective screening criteria were detected from four locations: MW06 (2 to 4 feet bgs) in the southern developed portion, TP01 (approximately 6.5 feet bgs) and TP02 (approximately 4 feet bgs) in the northeastern undeveloped portion, and TP06 (approximately 8 feet bgs) in the central undeveloped portion.

Pesticides

Eighteen pesticides were detected in the subsurface soils; however, their frequencies of detection were relatively low (*i.e.,* range: 0.02 to 0.29). Concentrations of 11 of the pesticides were above their respective screening criteria values, and exceedances were present in all of the sampled facility areas except the southwestern undeveloped portion. Elevated concentrations were typically found in the same areas of the facility as during the shallow soil investigation, as follows: boundary of the northeastern undeveloped portion and the floodplain undeveloped portion (MW05), eastern corner of the central undeveloped portion (MW09/TP09), western corner of the central undeveloped portion (MW11), and/or the northern corner of the northern developed portion in Building No. 1 (BSB08). Additional elevated concentrations were noted for specific pesticides, such as aldrin in MW06 (maximum of 53,000 ug/kg) and MW12 (maximum of 7,000 ug/kg); and endrin aldehyde in TP05 (3,700 ug/kg), TP06 (16,000 ug/kg) and TP08 (27,000 ug/kg).

Metals and Cyanide

The subsurface soils of the facility contained detectable concentrations of all 23 metals analyzed and cyanide. Maximum concentrations for over half of these constituents (*i.e.,* 14 of 24; or 58 percent) were detected in the central undeveloped portion. This is in opposition to the maximum concentrations present in the shallow soils which trended to the developed portion of the facility. Of the 16 constituents with available screening criteria, 12 exceeded their respective values in at least

400118

one portion of the facility, and exceedances were detected above criteria values up to a factor of 838 (arsenic); see Figures 1-13 and 1-14.

Non-Aqueous Phase Liquid

The potential for a non-aqueous phase liquid (NAPL) to exist in the soils was evaluated as part of the OU-2 RI. For soils, if greater than 10,000 mg/kg of contamination exists (*i.e.*, one percent of the soil mass), then a NAPL may be present (Bedient *et al.*, 1994).

Total PCBs were detected above 10,000 mg/kg in the following three locations: MW09 at 4 to 6 feet bgs (130,000 mg/kg); MW11 at 6 to 8 feet bgs (10,600 mg/kg); and TP09 at 5 feet bgs (29,000 mg/kg). MW09 and TP09 are located in the eastern corner of the central undeveloped portion of the facility, while MW11 is present in the western corner. Therefore, the potential exists for a NAPL to be present in the eastern part (MW09/TP09), and to a lesser extent the western part (MW11), of the central undeveloped portion of the facility. Significant accumulation of NAPL was not present in the descriptions of the MW09, MW11 and/or TP09 samples; some coloration of the soils (MW09, TP09), an "oily sheen" on the split-spoon (MW11) and/or staining and an odor (TP09) were noted. In addition, staining, "oily sheen" and/or odors were also observed in other sample locations such as TP03, TP08, MW02A, and MW06.

1.3.1.6.3 Perched Water

Water encountered in the overburden soil and weathered bedrock intervals during field activities was sampled to characterize potential source areas, to evaluate potential zones of contamination, and to identify potential contamination migration pathways. Samples were collected from five test pits (TP03, TP06, TP08, TP09, and TP10) for full organic and inorganic analyses and from five monitoring well borings (MW02, MW04, MW06, MW11, and MW12) for VOCs and PCBs and/or PCB congeners. The constituents detected during the perched water investigation exceeding screening criteria are presented on Figure 1-15.

Polychlorinated Biphenyls

The perched water samples contained three individual PCB constituents (Aroclor-1242, Aroclor-1248 and Aroclor-1254), and detected concentrations ranged from 0.65 ug/L to 5,100 ug/L. All of the occurrences exceeded screening criteria by factors up to 10,200. The northeastern undeveloped portion (TP03) and the contiguous boundary of the southern developed portion (MW04) had the least amount of PCBs in the perched water (i.e., 2.35 ug/L Total PCBs and non-detect, respectively). The most elevated Total PCB concentrations were present in the central undeveloped portion of the facility (*i.e.*, up to 7,400 ug/L). Location MW11, and to a lesser degree test pits TP10 and TP09, contained the highest amounts of Total PCBs in the perched water. These "hot spot" areas also contained the more elevated concentrations of PCB constituents in the soils. The elevated concentrations (*i.e.*, up to ppm levels) of chlorinated VOCs in both the subsurface soil and the perched water within and/or immediately adjacent to these areas have likely contributed to the leaching and solubilization of the PCB constituents through co-solvent effects.

400119

Two perched water samples, from monitoring well borings MW11 and MW12, were analyzed for PCB congeners, and 74 individual congener compounds/compound combinations were detected; details are provided in Table 4-11 of the OU-2 Remedial Investigation Report (TtFW, 2002). Location MW11, in the central undeveloped portion of the property, contained congener concentrations in the perched water ranging from 2.9 ug/L to 240 ug/L, with a total PCB congener concentration of 3,200 ug/L. The concentrations present in MW12 were relatively similar in magnitude, as individual occurrences were between 2.2 ug/L and 190 ug/L, and total PCB congeners summed to 2,300 ug/L.

Volatile Organic Compounds

Nineteen VOC compounds were identified in the perched water samples, and detected concentrations ranged from 0.4 ug/L (1,1,2,2-TCA; benzene) to 15,000 ug/L (TCE). Locations MW11 and MW12 contained the highest number of constituents (*i.e.*, both samples contained 17 VOCs) and the most elevated concentrations (*i.e.*, the samples contained maximum concentrations for 53 percent of the detected VOCs, at levels up to 15,000 ug/L). Screening criteria exceedances for the perched water occurred for a total of 10 compounds, including: 1,2,4-trichlorobenzene; 1,4-dichlorobenzene; chlorobenzene; 1,1-DCE; cis-1,2-DCE; trans-1,2-DCE; methylene chloride; PCE; TCE; and vinyl chloride. Six, two and nine VOCs, respectively, were detected at concentrations above screening criteria in the southern developed, northeastern undeveloped and central undeveloped portions, as shown on Figure 1-15. A majority of these constituents (*i.e.*, 8 of 10, or 80 percent) were also present in the surface and/or subsurface soils of these areas at concentrations exceeding soil screening criteria values, indicating the VOCs in the perched water samples are likely related to the direct dissolution of these constituents from the soils.

Semi-Volatile Organic Compounds

The perched water samples collected from the test pits contained 26 identifiable SVOCs, including phenols, PAHs, and phthalate esters. Individual compound concentrations were relatively low (i.e., the detected range was between 1 ug/L and 35 ug/L). Screening criteria exceedances occurred for the following seven PAH compounds in locations TP03 and/or TP06: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene (Figure 1-15). PAHs were detected in the soils above screening criteria, and co-solvency mediated by the VOC constituents present increases the likelihood that these constituents may become solubilized by percolating rainwater.

Pesticides

Ten pesticides were detected in the test pit perched water samples. TP03 in the northeastern undeveloped portion contained relatively low concentrations of these compounds, as the detected range was only from 0.02 ug/L to 0.2 ug/L. Pesticide concentrations in the central undeveloped portion of the facility (TP06/TP08/TP09/TP10) were more elevated (*i.e.*, between 0.87 ug/L and 33 ug/L). As shown on Figure 1-15, exceedance concentrations occurred for six of the ten pesticides (*i.e.*, 4,4'-DDE; aldrin; alpha-BHC; dieldrin; gamma-chlordane; and heptachlor), and these concentrations were detected up to 825 times greater than screening criteria.

Metals and Cyanide

The test pit water was also analyzed for inorganic constituents, and 22 metals and cyanide were detected. Concentrations typically followed the same distribution pattern as SVOCs and pesticides (*i.e.*, detected at more elevated concentrations in the central undeveloped portion when compared to the northeastern undeveloped portion). Aluminum, iron, lead, and manganese were present in TP03 (northeastern undeveloped portion) at concentrations above their screening criteria values (Figure 1-15). As shown on Figure 1-15, test pits TP08 and TP09 also contained exceedances of these four metals, plus arsenic and cadmium in TP08 only. A total of 14 metals had concentrations up to 1,190 times greater than screening criteria in TP06 and/or TP10.

Non-Aqueous Phase Liquid

The existence of NAPL was evaluated based on the disposal practices at the facility and VOC (particularly TCE) concentrations detected during the perched water investigation. It is a general rule that if a constituent is detected at a concentration greater than one percent of its solubility in a water sample, then a NAPL may be present (Bedient *et al.*, 1994). Using the maximum possible solubility value for the individual Aroclor constituents detected at the site (3.4×10^{-1} mg/L), the "one percent rule" solubility value for comparison would be 3.4×10^{-3} mg/L, or 3.4 ug/L. With the exceptions of MW04 and TP03, all of the sampled locations had PCB concentrations in the perched water above 3.4 ug/L. The most elevated Total PCB concentration, detected in MW11, was over 2,000 times this comparison solubility value. TCE has a water solubility of 1.1×10^{3} mg/L; one percent of this value would be 1.1×10^{1} mg/L, or 11,000 ug/L. Two locations, MW11 and MW12, contained TCE at concentrations greater than this comparison solubility value. Therefore, the potential exists for a NAPL to be present, especially in the vicinity of MW11 and MW12. During the OU-2 field investigation, no significant accumulation of NAPL was discovered for the perched water. Sheens were observed on the water infiltrating TP09 and BSB58, and location TP05 contained an "oily water seep" three feet from the end of the test pit.

1.3.1.7 Drainage System Investigation

Samples of representative drainage system locations around the developed portion of the facility were collected to determine the level of contamination in the facility drainage system and the potential for the system to be a source and/or facilitated transport mechanism for contamination. Five sediment samples (and one duplicate sample) and six standing water samples (and one duplicate sample) were analyzed. To facilitate interpretation of the data, the drainage system sediment and water results were compared to shallow soil and surface water screening criteria, respectively. Exceedances are mapped on Figures 1-16 (sediment) and 1-17 (water).

Polychlorinated Biphenyls

The five catch basin sediment sample locations contained relatively elevated concentrations of PCBs, and all of these occurrences exceeded screening criteria (Figure 1-16). Individual constituent concentrations ranged from 10,000 ug/kg (Aroclor-1254 in DS01) to 140,000 ug/kg (Aroclor-1254 in DS04B). Total PCBs summed to a maximum of 210 mg/kg in the sediments from location DS07.

As shown on Figure 1-17, PCBs were also detected in the drainage system water, again above screening criteria in all occurrences. Samples contained Aroclor-1248, Aroclor-1254, and/or Aroclor-1260 at concentrations between 0.13 ug/L (DS05) and 11 ug/L (DS02). Although PCBs typically have low aqueous solubilities, the elevated concentrations noted in the drainage system water samples may be due to co-solvent effects exerted by other dissolved organic constituents (*e.g.*, TCE, methylene chloride). In addition, the procedures to collect the drainage system water may also have generated sufficient suspended sediment particulates to increase the amount of PCBs detected in the water during analysis.

Volatile Organic Compounds

Seventeen VOCs were detected in the drainage system samples, with 10 and 12 compounds present in the sediment and water, respectively. Occurrences of individual VOCs in the drainage system sediments were at relatively low concentrations (*i.e.*, less than 70 ug/kg), and none of the VOCs were present above screening criteria. Detected standing water concentrations ranged from 0.3 ug/L (chlorobenzene) to 27 ug/L (TCE), and VOCs were detected in all of the samples except DS05 . As shown on Figure 1-17, exceedances of screening criteria occurred for four constituents: methylene chloride (13 ug/L in DS02 and DS04A), TCE (2 ug/L in DS03 and 27 ug/L in DS06A), PCE (0.4 ug/L in DS06A), and vinyl chloride (0.9 ug/L in DS01 and 0.4 ug/L in DS03).

Semi-Volatile Organic Compounds

The detected SVOCs in the drainage system samples were generally phthalate esters, or PAHs. The sediment samples contained phthalate compounds up to 13,000 ug/kg (bis(2-ethylhexyl)phthalate in location DS05); however, there were no exceedances of screening criteria for these compounds. Bis(2-ethylhexyl)phthalate was present in the standing water sample from DS01 (which is the sump pit located in the basement of Building No. 15), at an exceedance concentration of 10 ug/L (Figure 1-17). Seventeen PAHs were detected in the drainage system sediments, and constituent concentrations ranged from 150 ug/kg to 11,000 ug/kg. The maximum concentrations for the individual PAHs were mainly present in DS05 (*i.e.*, 10 of the 17; or 59 percent), where a sheen was visible on the water after disturbance of the sediment layer and a petroleum odor was noted during sampling. Seven compounds (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) had sediment concentrations above their respective screening criteria values (Figure 1-16). PAHs were not detected in the drainage system water collected as part of the OU-2 RI.

Pesticides

A total of 11 pesticides was present in the drainage system sediment samples. Detected concentrations in the catch basin sediments ranged from 58 ug/kg (alpha-BHC) to 33,000 ug/kg (DDT), and the more elevated sediment concentrations generally occurred in DS04B and/or DS07. Exceedances occurred at all of the sampled locations, and 9 of the 11 pesticides detected in the drainage system sediments were present above screening criteria (Figure 1-16). The drainage system water sample from DS03 contained gamma-BHC (0.036 ug/L). Three pesticides (alpha-BHC at 0.012 ug/L, gamma-BHC at 0.024 ug/L and heptachlor at 0.028 ug/L) were detected in the DS06A sample. All of these occurrences were above the most conservative surface water screening criteria (Figure 1-17).

Metals and Cyanide

All 24 inorganic constituents (23 metals and cyanide) were detected in the drainage system sediments. Of these, 14 had concentrations that were above their respective screening criterion values (Figure 1-16). These constituents were also present in site shallow soils at exceedance concentrations, and deposition of soil particles from storm water run-off likely accounts for their presence in the drainage system sediments.

The drainage system water contained occurrences of 20 metals, with nine constituents (aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, and zinc) detected at concentrations exceeding screening criteria (Figure 1-17). At least a portion of the metal concentrations in the water samples may be related to suspended sediment particulates generated during sampling activities.

1.3.2 Contaminant Fate and Transport

Investigative results indicate that the airborne entrainment of contaminated soil particulates has been a significant environmental transport mechanism at the Cornell-Dubilier Electronics site that has resulted in site-related contaminants (primarily PCBs) spreading to facility building interiors (dust) and several residential, commercial and municipal properties in the vicinity of the former facility (soils and/or in-house dust). While this transport mechanism has been considerably reduced from that in the past due to (1) the paving of facility roadways, (2) the presence of vegetation on a majority of the undeveloped portion of the facility, and (3) the reduction in vehicular traffic (e.g., the cessation of the truck training operations in the central undeveloped portion of the facility) that had existed at the industrial park, airborne entrainment can and may still occur on a much more reduced scale in a few limited areas (i.e., exposed surficial soil areas).

Due to the poor condition of the building floors, dust can be generated from the degradation of the concrete slabs/floors within the buildings. Contaminants present in the surficial layer of the building floors can become incorporated in the resulting dust generated within the buildings. Additionally, there is a potential for this contaminated dust to be tracked outside of the buildings by the operations/employees at the industrial park.

The emission of volatile organic compounds from exposed surficial and subsurface soils and near surface, perched groundwater is expected in the undeveloped portion of the facility, since high concentrations of volatile contaminants are present in: (1) the vadose zone soils at the facility and near surface, perched groundwater; and (2) soil gas in the vadose zone interstitial voids. The pavement and/or concrete slabs on the developed portion of the facility would restrict volatile emissions from subsurface source materials. The vegetative cover (particularly grass mats) would also inhibit volatile emissions. In addition, volatile compounds may be emitted from surface runoff and transitory ponded stormwater. Therefore, volatile emissions, with their concomitant migration via the prevailing wind, would be a viable (although minor) transport mechanism for most of the undeveloped portion of the facility.

400123

Prior to the implementation of the site stabilization order in 1997, migration of contaminants by vehicle traffic was an important environmental fate and transport mechanism at the facility. Elevated concentrations of constituents of concern were present in the shallow soils collected from the roadway areas, and it is likely that surficial soil particles to which these constituents were adsorbed adhered to vehicles traversing the facility. Subsequent travel around and off the facility may have redeposited the contaminated soil particulates. The paving of the roadways in 1997 significantly reduced this transport mechanism.

Transitory ponding of stormwater occurs at several locations in puddles, ruts, and low lying areas and wetlands during extremely wet periods or intense rainstorms. Contaminants may become solubilized in these locations from underlying contaminated soils and spread laterally to uncontaminated soils by adsorption or by residuals remaining when the ponded water recedes and/or percolates into the soil. Stormwater ponding areas where this type of contaminant migration is likely to occur are the three wetland areas adjacent to the paved area near the southwestern property line and numerous wetland/non-wetland areas throughout the Bound Brook floodplain along the southern and eastern portions of the facility. Among the contaminants near or within these areas, primarily acetophenone, cyanide and metals would be expected to be dispersed within the ponded water to adjacent soils. The dispersion of PCBs, PAHs and pesticides may also be augmented at these locations due to the co-solvent effects of dissolved organic constituents. As a result of this migration (although infrequent and only for short durations over relatively small areas within the facility boundaries), contaminants (primarily metals) may be redistributed to adjacent soils.

During storm events, contaminants may become solubilized in the surface runoff from underlying contaminated soil. This runoff would then be transported via a man-made surface water drainage ditch (designed and constructed as part of the site stabilization order issued to the facility owner in 1997) and several other natural drainage ditches/preferential stormwater routes (undeveloped portion of the property) and numerous catch basins of the storm sewer system (developed portion of the property) that discharge via outfall pipes to an unnamed tributary of Bound Brook or to Bound Brook directly. During transport, some infiltration of contaminated rainwater to the underlying soils/sediments would occur, and contaminated soil particles entrained within the rainwater may also be transported from the facility and deposited to the storm sewer, and the unnamed tributary or Bound Brook. The sediments within these conduits serve as the primary sinks for site-related contaminants migrating from the facility, particularly within the drainage system, unnamed tributary, and Bound Brook. Thus, the migration of contaminants dissolved within or adsorbed onto entrained soil particles within surface runoff (particularly during heavy rainfall events) was and still remains a significant transport mechanism for contaminants to migrate from the facility. Migration from the drainage system to the soil surrounding the storm sewer pipes (*i.e.*, leaks) may also be occurring (or may have already occurred), as the integrity of the drainage system piping is unknown.

The migration of contaminants to underlying groundwater by the percolation of rainwater through contaminated soils and/or the capacitor disposal areas is a major environmental fate and transport mechanism at the facility. The OU-2 RI data indicate that numerous organic contaminants have migrated to a greater extent in subsurface soil (to fractured bedrock) than expected based solely on physicochemical characteristics. This enhanced migration for some of the organic contaminants is speculated to be due to co-solvent effects exerted by the more mobile volatile organic contaminants, primarily TCE and 1,2-DCE. Bedrock groundwater data indicate that migration of volatile organic compounds and PCBs through soil via percolating rainwater into groundwater has occurred. Data obtained during the performance of the OU-2 RI indicate that perched groundwater areas exist beneath the facility that are contaminated with VOCs, PCBs, metals, and to a more limited extent, pesticides, acetophenone, cyanide and PAHs. These contaminants have migrated from the overlying soil via percolating rainwater to the perched zone. The weathered bedrock layer, where present on the property, may limit downward migration.

Upon entering groundwater, contaminants are expected to migrate with the local groundwater flow until dilution and removal mechanisms such as adsorption, hydrolytic degradation (endosulfan), precipitation, and limited volatilization result in a reduction of their concentrations to below detectable levels. Preliminary data collected during the installation of the monitoring wells during this OU-2 investigation indicated that groundwater in the upper fractured bedrock aquifer generally flows to the northwest. Vertically, the available data has shown that site-related contaminants (VOCs and PCBs) have migrated to and within groundwater present in the upper fractured bedrock.

Based solely upon physicochemical characteristics, VOCs, acetophenone, cyanide, and dissolved metals would be expected to migrate the farthest in groundwater, until eventually being diluted to below detection limit values. PCBs, dioxin/furans, PAHs, phthalate esters, pesticides, and metals associated with fine particulates are expected to migrate with the groundwater flow for only a limited distance. However, co-solvent effects exerted by more mobile organic contaminants present in the groundwater may enhance the migration of PCBs, dioxin/furans, PAHs, phthalate esters, and pesticides.

Migration of contaminants to and within surface water and sediments was verified by the historical data for Bound Brook and its associated downstream receiving waterbodies (i.e., New Market Pond). The historical data indicated that PCBs, pesticides, VOCs, PAHs, and metals are present in the sediments and/or floodplain soil. PCBs, VOCs, and metals were also detected in the surface water samples. Based on physicochemical characteristics, this transport mechanism also would likely be important for dioxins/furans; however, no surface water or sediment data exist for these compounds.

The migration of contaminants into biota, especially edible fish species within Bound Brook and its tributaries, New Market Pond and Spring Lake, is of concern. NJDEP has issued an extensive fish consumption advisory for these waters due to measured PCB levels in edible fish species (NJDEP, 1998). Based on bioconcentration factors and organism depuration rates, this transport mechanism is important for PCBs, dioxins/furans, pesticides, mercury and silver, and, to a lesser extent, zinc and barium.

1.3.3 Human Health Risk Assessment

The approach taken in preparing the Baseline Human Health Risk Assessment (BHHRA) used EPA-approved exposure models coupled with conservative assumptions about exposure conditions, to generate reasonable maximum exposure (RME) and central tendency (CT) estimates of the baseline (no further remedial action assumed) health risks associated with chemicals present in facility soils and indoor building dust. For the purpose of the BHHRA, the facility was divided into two areas, denoted Area A (generally the western part of the property) and Area B (generally the eastern part of the property), reflecting the historical property usage relative to managing the analytical data. The data was subsequently subdivided by type: surface soil, all soil (surface soil combined with subsurface soil samples) and building dust samples, resulting in a total of five data sets.

Chemicals of Potential Concern (COPCs) were selected by data type on the basis of a multi-step screening process. The media concentration used in the screening process was the maximum detected concentration. The list of COPCs ranged from 17 in building dust to 59 in Area B All Soil and included VOCs, SVOCs, pesticides, PCBs, and metals.

RME scenarios were evaluated using the 95th percentile UCL of the mean chemical concentrations, in the exposure medium, or the maximum detected concentration if the UCL value exceeded the maximum concentration, combined with conservative but realistic exposure parameters. CT exposure scenarios were evaluated using the 95th percentile chemical concentrations in the exposure medium, combined with 50th percentile exposure parameters from EPA guidance. The statistical analysis identified a number of data points that were considered statistical outliers within the data sets. Therefore, for those data sets, a chemical-specific EPC was calculated including the outliers and another EPC was calculated excluding the outliers for use in the risk characterization.

Conservative exposure pathways chosen for quantitative analysis consisted of ingestion and dermal contact with soil and dust, and inhalation of chemicals (particulates and volatile chemicals) in soil by the following populations:

- Current and Future Trespassers;
- Current and Future Facility Workers (indoor and outdoor); and
- Future Construction Workers

Results of the BHHRA are summarized as follows:

- Constituents that were deemed "significant contributors" during the risk assessment of the various soils or indoor dust included:

  1,1-DCE
  2,3,7,8-TCDD
  aldrin
  alpha-BHC
  Aroclor-1242
  Aroclor-1248
  Aroclor-1254
  arsenic
  benzene
  benzo(a)anthracene
  benzo(a)pyrene
  benzo(b)fluoranthene
  benzo(k)fluoranthene
  chrysene
  DDE
  DDT
  dibenz(a,h)anthracene
  dieldrin
  dioxin-like PCBs
  gamma-chlordane
  heptachlor
  heptachlor epoxide
  indeno(1,2,3-cd)pyrene
  non-dioxin-like PCBs
  PCE
  TCE
  Total PCBs
  vinyl chloride

- Both noncancer and cancer health effects were evaluated in the BHHRA. The benchmark for the noncancer hazard index is 1.0 and the benchmark for the cancer risks is 1.0E-04 with an acceptable risk range of 1.0E-04 to 1.0E-06.

- The noncancer hazards for all populations regardless of the exposure scenario (RME or CT; current or future) and the data set, exceeded the EPA benchmark of 1.0. It should be noted that the hazard index (HIs) from data sets excluding the outliers were usually 50 percent lower than the HIs that included the data set outliers, but still exceeded the benchmark of 1.0.

- The cancer risks for current trespassers in Area A exceeded the EPA risk range under the RME scenario but was within the risk range under the CT scenario. In Area B, the RME and CT scenarios using the data set including the outliers and the RME scenario excluding the outliers exceeded the EPA risk range. However, the CT scenario using the data set excluding the outliers was within the EPA risk range. The cancer risks for future trespassers in Area A were within the EPA risk range for the RME scenarios using both the data sets including the outliers and excluding the outliers. In Area B, the RME and CT scenarios using both the data sets (including the outliers and excluding the outliers) exceeded the EPA risk range.

- The cancer risks for current outdoor workers in Area A exceeded the EPA risk range under the RME scenario but was within the risk range under the CT scenario. In Area B, the RME and CT scenarios using both the data sets (including the outliers and excluding the outliers) exceeded the EPA risk range. The cancer risks for future outdoor workers in Area A exceeded the risk range for the RME scenarios using both the data sets (including the outliers and excluding the outliers). However, both of the CT scenarios (using the data sets including the outliers and excluding the outliers) were within the EPA risk range. In Area B, the RME and CT scenarios using both the data sets including the outliers and excluding the outliers exceeded the EPA risk range.

- The cancer risks for current indoor workers in Area A was within the EPA risk range under the RME scenario. The cancer risks for future indoor workers in Area B exceeded the EPA risk range for both the RME and CT scenarios.

- The cancer risks for future construction workers in Area A were within the EPA risk range for the RME scenarios using both the data set including the outliers and the data set excluding the outliers. In Area B, the RME scenarios using both data sets (including the outliers and excluding the outliers) exceeded the EPA risk range.

- The COPC responsible for generating the elevated hazard index was Aroclor-1254, while Total PCBs generated the high cancer risks. Other long-term adverse health effects of PCBs observed in laboratory animals include a reduced ability to fight infections, low birth weights, and learning problems.

Lead was assessed separately due to a lack of a published reference dose. Lead was retained as a COPC in four data sets: surface soil in Area A, all soil in Area A, all soil in Area B, and indoor dust. The mean lead concentration for each data set was compared to the average industrial lead cleanup value of 1,250 mg/kg. The mean lead concentrations in Area A Surface Soil and indoor dust exceeded the screening levels. The mean lead concentration in

Area A Surface Soil was 11,000 mg/kg, and the mean lead concentration in indoor dust was 5,248 mg/kg.

1.3.4 Ecological Risk Assessment

An Ecological Risk Assessment (ERA) was performed for the property using methodology consistent with current guidance (EPA, 1997a). The ERA considered only a single environmental media as the primary, abiotic media of concern, facility soils found within the existing property boundary. The ERA performed included both a Screening Level Ecological Risk Assessment (SLERA), consistent with Ecological Risk Assessment Guidance for Superfund (ERAGS) Steps 1 and 2, and a baseline problem formulation and refined exposure assessment (BERA), consistent with Step 3 of the ERAGS process.

An ecological assessment was performed to characterize the existing habitats and land use present on the facility to determine if adequate habitat was present to support ecological receptors. Results of this assessment are summarized in the following:

- No significant habitat for ecological receptors was noted in the developed portion of the facility (11.6 acres).
- Pathways of direct exposure by ecological receptors to contaminated surface soils in the developed areas were deemed incomplete as large areas remained covered by impervious areas of asphalt and concrete slabs.
- Habitats present within the undeveloped portion (14.4 acres) of the facility included multiple vegetation covertypes associated with forested uplands, isolated wetlands, and floodplain wetlands which were all associated with the contiguous habitats continuing off the facility property along the channel of Bound Brook.
- Forty bird species, 11 mammal species and six reptile and amphibian species were recorded as observed within the Bound Brook Corridor (a significant habitat for ecological receptors).

The SLERA was performed to: (1) provide a preliminary list of contaminants of potential ecological concern; (2) confirm the presence of complete exposure pathways and exposure routes to ecological receptors; and (3) compare concentrations of contaminants present to conservative ecological screening level benchmarks. Results of this evaluation are summarized as follows:

- The principal medium of concern for exposure of ecological receptors was surface soils (0 to 0.5 feet bgs).
    - The developed portions of the facility afforded no significant habitat and the impervious nature of the ground surface in this area rendered the direct contact with surface soils extremely limited. Given the lack of habitat and the impervious cover over the surface soils, the exposure pathway for ecological receptors to come into contact with contaminants present in this part of the facility was deemed incomplete.

- The undeveloped areas of the facility including the upland forests, open fields and wetland areas were deemed as significant habitat supporting ecological receptors. The direct contact with surface soils pathway in the undeveloped portion of the facility was deemed complete. Analytical sampling of the surface soils in this undeveloped part revealed the presence of 104 organic compounds and elements including VOCs, SVOCs, pesticides/PCBs, dioxins, and metals.

- A conceptual site model was developed to identify exposure pathways and routes of exposure for ecological receptors. Exposure pathways included direct contact with soils, ingestion of contaminated biota, and incidental ingestion of soils during feeding or grooming.

- A screening level assessment using generic, conservative screening values and maximum observed concentrations revealed 71 contaminants to exceed these screening values. Maximum concentrations of these 71 contaminants were further screened using ecological benchmarks deemed protective of heterotrophic soil microbial processes, soil invertebrates and terrestrial plants. Additionally, food chain evaluations using maximum concentrations and maximized exposure parameters and bioaccumulation factors were performed for four wildlife receptors: the short-tailed shrew, red fox, American robin, and red-tailed hawk. Sixty-three of the contaminants exceeded at least one of the benchmarks for the direct contact pathway considering microbial, soil invertebrate and terrestrial plant endpoints.

- Results of the screening level food chain evaluation revealed No Observed Adverse Effect Level (NOAEL) Hazard Quotients (HQs) of <1 to 499,000 for the shrew; NOAEL HQs of <1 to 2,445 for the red fox; NOAEL HQs of <1 to 267,000 for the American robin; and NOAEL HQs of <1 to 1,339 for the red-tailed hawk. The highest observed HQs for all receptors were associated with PCBs, dioxins, and DDT and its metabolites.

A refined exposure assessment for the wildlife receptors was developed as part of a baseline problem formulation assessment for the property. Results of this evaluation are as follows:

- The refined exposure assessment utilized mean concentrations of all contaminants with NOAEL HQs >1 observed in the screening level assessment and modified exposure parameters to reflect species-specific feeding and behavioral characteristics.

- The exposure assessment models were re-evaluated in consideration of the revised exposure parameters.
- Lowest Observed Adverse Effect Level (LOAEL) HQs ranged from 1.2 to 7,291 for the short-tailed shrew, with the highest HQs being associated with DDT and its metabolites, Total PCBs, Aroclor-1248, Aroclor-1254, dioxins, and dioxin-like PCB congeners.

- LOAEL HQs ranged from 2 to 84 for the red fox, with the highest HQs being associated with Total PCBs, Aroclor-1248, Aroclor-1254, dioxins, aluminum, and dioxin-like PCB congeners.

- LOAEL HQs ranged from 2 to 1,950 for the American robin, with the highest HQs being associated with aldrin, DDT and its metabolites, Total PCBs, Aroclor-1248, Aroclor-1254, dioxins, and dioxin-like PCB congeners.

- LOAEL HQs ranged from 2 to 46.5 for the red-tailed hawk, with the highest HQs being associated with Total DDT and its metabolites, Total PCBs, Aroclor-1248, Aroclor-1254, dioxins, and dioxin-like PCB congeners.

Results of the ERA revealed that ecological receptors associated with the undeveloped areas of the facility may be at excess risk from site-related contaminants associated with historical practices of electronics and capacitor manufacturing (*i.e.*, PCBs, PAHs, and metals). High concentrations of pesticides were also associated with risk to ecological receptors, though direct linkage to the historical site operations remains unclear.

SECTION 1

TABLES

TABLE 1-1 (Sheet 1 of 6)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Volatile Organics								
Dichlorodifluoromethane	--	--	--	--	--	--	--	--
Chloromethane (1)	--	--	--	--	520	10	--	10
Vinyl Chloride	0.9	0.6	0.01	--	2	10	--	0.01
Bromomethane	110	9	0.2	--	79	1	--	0.2
Chloroethane	--	--	--	--	--	--	--	--
Trichlorofluoromethane	--	--	--	--	--	--	--	--
1,1-Dichloroethene	1	0.07	0.06	--	8	10	--	0.06
1,1,2-Trichloro-1,2,2-trifluoroethane	--	--	--	--	--	--	--	--
Acetone	7800	--	16	--	1000	100	--	16
Carbon Disulfide	7800	720	32	--	--	--	--	32
Methyl Acetate	--	--	--	--	--	--	--	--
Methylene Chloride	85	13	0.02	--	49	1	--	0.02
trans-1,2-Dichloroethene	1600	--	0.7	--	1000	50	--	0.7
Methyl tert-Butyl Ether	--	--	--	--	--	--	--	--
1,1-Dichloroethane	7800	1200	23	--	570	10	--	10
cis-1,2-Dichloroethene	780	--	0.4	--	79	1	--	0.4
2-Butanone (2)	--	--	--	--	1000	50	--	50
Chloroform	100	0.3	0.6	--	19	1	--	0.3
1,1,1-Trichloroethane	--	1200	2	--	210	50	--	2
Cyclohexane	--	--	--	--	--	--	--	--
Carbon Tetrachloride	5	0.3	0.07	--	2	1	--	0.07
Benzene	22	0.8	0.03	--	3	1	--	0.03
1,2-Dichloroethane	7	0.4	0.02	--	6	1	--	0.02
Trichloroethene	58	5	0.06	--	23	1	--	0.06
Methylcyclohexane	--	--	--	--	--	--	--	--
1,2-Dichloropropane	9	15	0.03	--	10	--	--	0.03
Bromodichloromethane	10	--	0.6	--	11	1	--	0.6
cis-1,3-Dichloropropene	6	1	0.004	--	4	1	--	0.004
4-Methyl-2-Pentanone (3)	--	--	--	--	1000	50	--	50
Toluene	16000	650	12	--	1000	500	200	12

400132

TABLE 1-1 (Sheet 2 of 6)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
trans-1,3-Dichloropropene	6	1	0.004	--	4	1	--	0.004
1,1,2-Trichloroethane	11	1	0.02	--	22	1	--	0.02
Tetrachloroethene	12	10	0.06	--	4	1	--	0.06
2-Hexanone	--	--	--	--	--	--	--	--
Dibromochloromethane	8	--	0.4	--	110	1	--	0.4
1,2-Dibromoethane	--	--	--	--	--	--	--	--
Chlorobenzene	1600	130	1	--	37	1	40	1
Ethylbenzene	7800	400	13	--	1000	100	--	13
Xylenes (total)	160000	--	190	--	410	67	--	67
Styrene	16000	1500	4	--	23	100	300	4
Bromoform	81	52	0.8	--	86	1	--	0.8
Isopropylbenzene (4)	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	3	0.6	0.003	--	34	1	--	0.003
1,3-Dichlorobenzene	--	--	--	--	5100	100	--	100
1,4-Dichlorobenzene	20	--	2	--	570	100	20	2
1,2-Dichlorobenzene	5500	600	17	--	5100	50	--	17
1,2-Dibromo-3-chloropropane	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	610	3200	5	--	68	100	20	5
Semi-Volatile Organics								
Benzaldehyde	--	--	--	--	--	--	--	--
Phenol	37000	--	100	--	10000	50	30	30
bis(2-Chloroethyl) ether	0.4	0.2	0.0004	--	0.66	10	--	0.0004
2-Chlorophenol	310	--	4	--	280	10	--	4
2-Methylphenol	3100	--	15	--	2800	--	--	15
2,2'-oxybis(1-Chloropropane)	--	--	--	--	2300	10	--	10
Acetophenone	--	--	--	--	--	--	--	--
4-Methylphenol	--	--	--	--	2800	--	--	2800
N-Nitroso-di-n-propylamine	0.7	--	0.00005	--	0.66	10	--	0.00005
Hexachloroethane	35	54	0.5	--	6	100	--	0.5
Nitrobenzene	31	90	0.1	--	28	10	--	0.1
Isophorone	510	--	0.5	--	1100	50	--	0.5

400133

TABLE 1-1 (Sheet 3 of 6)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
2-Nitrophenol	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	1200	--	9	--	1100	10	--	9
bis(2-Chloroethoxy)methane	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	180	--	1	--	170	10	--	1
Naphthalene	1100	170	84	--	230	100	--	84
4-Chloroaniline	240	--	0.7	--	230	--	--	0.7
Hexachlorobutadiene	6	8	2	--	1	100	--	1
Caprolactam	--	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	--	--	--	--	10000	100	--	100
2-Methylnaphthalene	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	430	10	400	--	400	100	10	10
2,4,6-Trichlorophenol	44	200	0.2	--	62	10	4	0.2
2,4,5-Trichlorophenol	6100	--	270	--	5600	50	9	9
1,1'-Biphenyl	--	--	--	--	--	--	60	60
2-Chloronaphthalene	--	--	--	--	--	--	--	--
2-Nitroaniline	--	--	--	--	--	--	--	--
Dimethylphthalate	--	--	--	--	10000	50	--	50
2,6-Dinitrotoluene	0.7	--	0.0007	--	1	10	--	0.0007
Acenaphthylene	--	--	--	--	--	--	--	--
3-Nitroaniline	--	--	--	--	--	--	--	--
Acenaphthene	3400	--	570	--	3400	100	20	20
2,4-Dinitrophenol	120	--	--	--	110	10	20	0.2
4-Nitrophenol	--	--	--	--	--	--	7	7
Dibenzofuran	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	0.7	--	0.0008	--	1	10	--	0.0008
Diethylphthalate	49000	--	470	--	10000	50	100	50
Fluorene	2300	--	560	--	2300	100	--	100
4-Chlorophenyl-phenylether	--	--	--	--	--	--	--	--
4-Nitroaniline	--	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	99	--	1	--	140	100	--	1

400134

TABLE 1-1 (Sheet 4 of 6)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
4-Bromophenyl-phenylether	--	--	--	--	--	--	--	--
Hexachlorobenzene	0.3	1	2	--	0.66	100	--	0.3
Atrazine	--	--	--	--	--	--	--	--
Pentachlorophenol	3	--	0.03	--	6	100	3	0.03
Phenanthrene	--	--	--	--	--	--	--	--
Anthracene	17000	--	12000	--	10000	100	--	100
Carbazole	24	--	0.6	--	--	--	--	0.6
Di-n-butylphthalate	6100	--	2300	--	5700	100	200	100
Fluoranthene	2300	--	4300	--	2300	100	--	100
Pyrene	1700	--	4200	--	1700	100	--	100
Butylbenzylphthalate	12000	--	930	--	1100	100	--	100
3,3'-Dichlorobenzidine	1	--	0.007	--	2	100	--	0.007
Benzo(a)anthracene	0.6	--	2	--	0.9	500	--	0.6
Chrysene	62	--	160	--	9	500	--	9
bis(2-Ethylhexyl)phthalate	35	--	3600	--	49	100	--	35
Di-n-octylphthalate	1200	--	10000	--	1100	100	--	100
Benzo(b)fluoranthene	0.6	--	5	--	0.9	50	--	0.6
Benzo(k)fluoranthene	6	--	49	--	0.9	500	--	0.9
Benzo(a)pyrene	0.06	--	8	--	0.66	100	--	0.06
Indeno(1,2,3-cd)pyrene	0.6	--	14	--	0.9	500	--	0.6
Dibenz(a,h)anthracene	0.06	--	2	--	0.66	100	--	0.06
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--
Pesticides/PCBs								
alpha-BHC	0.1	0.7	0.0005	--	--	--	--	0.0005
beta-BHC	0.4	6	0.003	--	--	--	--	0.003
delta-BHC	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	0.4	--	0.009	--	0.52	50	--	0.009
Heptachlor	0.1	4	23	--	0.15	50	--	0.1
Aldrin	0.04	3	0.5	--	0.04	50	--	0.04
Heptachlor epoxide	0.07	5	0.7	--	--	--	--	0.07
Endosulfan I	470	--	18	--	340	50	--	18

400135

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Dieldrin	0.04	1	0.004	--	0.042	50	--	0.004
4,4'-DDE	2	--	54	--	2	50	--	2
Endrin	23	--	1	--	17	50	--	1
Endosulfan II	470	--	18	--	340	50	--	18
4,4'-DDD	3	--	16	--	3	50	--	3
Endosulfan sulfate	--	--	--	--	--	--	--	--
4,4'-DDT	2	--	32	--	2	500	--	2
Methoxychlor	390	--	160	--	280	50	--	50
Endrin ketone	--	--	--	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--	--	--	--
alpha-Chlordane	2	72	10	--	--	--	--	2
gamma-Chlordane	2	72	10	--	--	--	--	2
Toxaphene	0.6	87	31	--	0.1	50	--	0.1
Aroclor-1016	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1221	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1232	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1242	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1248	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1254	--	--	--	--	0.49***	50 ***	0.371***	0.371
Aroclor-1260	--	--	--	--	0.49***	50 ***	0.371*	0.371
Total PCBs	--	--	--	1**	0.49	50	0.371	0.371
Dioxins/Furans								
2,3,7,8-TCDD	--	--	--	0.001**	--	--	0.00000315	0.00000315
Metals and Cyanide								
Aluminum	--	--	--	--	--	--	--	--
Antimony	31	--	5	--	14	SS	5	5
Arsenic	0.4	770	29	--	20	SS	9.9	0.4
Barium	5500	710000	1600	--	700	SS	283	283
Beryllium	160	1400	63	--	2	SS	10	2
Cadmium	70	1800	8	--	39	SS	4	4
Calcium	--	--	--	--	--	--	--	--

400136

TABLE 1-1 (Sheet 6 of 6)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SHALLOW SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	DOE Soil Preliminary Remediation Goals for Ecological Endpoints (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Chromium	230****	280****	38****	--	240****	SS	0.4	0.4
Cobalt	--	--	--	--	--	--	20	20
Copper	--	--	--	--	600	SS	60	60
Iron	--	--	--	--	--	--	--	--
Lead	400	--	--	--	400	SS	40.5	40.5
Magnesium	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	--	--	--	--
Mercury	23	10	2	--	14	SS	0.00051	0.00051
Nickel	1600	14000	130	--	250	SS	30	30
Potassium	--	--	--	--	--	--	--	--
Selenium	390	--	5	--	63	SS	0.21	0.21
Silver	390	--	34	--	110	SS	2	2
Sodium	--	--	--	--	--	--	--	--
Thallium	6	--	0.7	--	2	SS	1	0.7
Vanadium	550	--	6000	--	370	SS	2	2
Zinc	23000	--	12000	--	1500	SS	8.5	8.5
Cyanide	1600	--	40	--	1100	SS	--	40

Notes:
All soil criteria values are provided in mg/kg.
DAF = Dilution-Attenuation Factor.
SS = Site-specific.
-- = No criterion value available.
* = SSLs provided directly from guidance document; in Section 6.0, screening criteria updated using latest toxicity information.
** = Criteria values are for residential soil and were provided by EPA Region 2 (EPA, 2002a). Industrial soil criteria are 10 mg/kg and 0.005 mg/kg for PCBs and 2,3,7,8-TCDD, respectively.
*** = Criteria values correspond to sum of all PCBs.
**** = Criteria values correspond to total (if available) or hexavalent chromium.
(1) = Also known as methyl chloride.
(2) = Also known as methyl ethyl ketone (MEK)
(3) = Also known as methyl isobutyl ketone (MIBK).
(4) = Also known as 1-methyl ethyl benzene.

400137

TABLE 1-2 (Sheet 1 of 7)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Volatile Organics							
Dichlorodifluoromethane	--	--	--	--	--	--	--
Chloromethane (1)	--	--	--	--	520	10	10
Vinyl Chloride	0.9	0.6	0.01	--	2	10	0.01
Bromomethane	110	9	0.2	--	79	1	0.2
Chloroethane	--	--	--	--	--	--	--
Trichlorofluoromethane	--	--	--	--	--	--	--
1,1-Dichloroethene	1	0.07	0.06	--	8	10	0.06
1,1,2-Trichloro-1,2,2-trifluoroethane	--	--	--	--	--	--	--
Acetone	7800	--	16	--	1000	100	16
Carbon Disulfide	7800	720	32	--	--	--	32
Methyl Acetate	--	--	--	--	--	--	--
Methylene Chloride	85	13	0.02	--	49	1	0.02
trans-1,2-Dichloroethene	1600	--	0.7	--	1000	50	0.7
Methyl tert-Butyl Ether	--	--	--	--	--	--	--
1,1-Dichloroethane	7800	1200	23	--	570	10	10
cis-1,2-Dichloroethene	780	--	0.4	--	79	1	0.4
2-Butanone (2)	--	--	--	--	1000	50	50
Chloroform	100	0.3	0.6	--	19	1	0.3
1,1,1-Trichloroethane	--	1200	2	--	210	50	2
Cyclohexane	--	--	--	--	--	--	--
Carbon Tetrachloride	5	0.3	0.07	--	2	1	0.07
Benzene	22	0.8	0.03	--	3	1	0.03
1,2-Dichloroethane	7	0.4	0.02	--	6	1	0.02
Trichloroethene	58	5	0.06	--	23	1	0.06
Methylcyclohexane	--	--	--	--	--	--	--
1,2-Dichloropropane	9	15	0.03	--	10	--	0.03

400138

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Bromodichloromethane	10	--	0.6	--	11	1	0.6
cis-1,3-Dichloropropene	6	1	0.004	--	4	1	0.004
4-Methyl-2-Pentanone (3)	--	--	--	--	1000	50	50
Toluene	16000	650	12	--	1000	500	12
trans-1,3-Dichloropropene	4	1	0.004	--	4	1	0.004
1,1,2-Trichloroethane	11	1	0.02	--	22	1	0.02
Tetrachloroethene	12	10	0.06	--	4	1	0.06
2-Hexanone	--	--	--	--	--	--	--
Dibromochloromethane	8	--	0.4	--	110	1	0.4
1,2-Dibromoethane	--	--	--	--	--	--	--
Chlorobenzene	1600	130	1	--	37	1	1
Ethylbenzene	7800	400	13	--	1000	100	13
Xylenes (total)	160000	--	190	--	410	67	67
Styrene	16000	1500	4	--	23	100	4
Bromoform	81	52	0.8	--	86	1	0.8
Isopropylbenzene (4)	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	3	0.6	0.003	--	34	1	0.003
1,3-Dichlorobenzene	--	--	--	--	5100	100	100
1,4-Dichlorobenzene	20	--	2	--	570	100	2
1,2-Dichlorobenzene	5500	600	17	--	5100	50	17
1,2-Dibromo-3-chloropropane	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	610	3200	5	--	68	100	5
Semi-Volatile Organics							
Benzaldehyde	--	--	--	--	--	--	--
Phenol	37000	--	100	--	10000	50	50
bis(2-Chloroethyl) ether	0.4	0.2	0.0004	--	0.66	10	0.0004
2-Chlorophenol	310	--	4	--	280	10	4

TABLE 1-2 (Sheet 3 of 7)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
2-Methylphenol	3100	--	15	--	2800	--	15
2,2'-oxybis(1-Chloropropane)	--	--	--	--	2300	10	10
Acetophenone	--	--	--	--	--	--	--
4-Methylphenol	--	--	--	--	2800	--	2800
N-Nitroso-di-n-propylamine	0.7	--	0.00005	--	0.66	10	0.00005
Hexachloroethane	35	54	0.5	--	6	100	0.5
Nitrobenzene	31	90	0.1	--	28	10	0.1
Isophorone	510	--	0.5	--	1100	50	0.5
2-Nitrophenol	--	--	--	--	--	--	--
2,4-Dimethylphenol	1200	--	9	--	1100	10	9
bis(2-Chloroethoxy)methane	--	--	--	--	--	--	--
2,4-Dichlorophenol	180	--	1	--	170	10	1
Naphthalene	1100	170	84	--	230	100	84
4-Chloroaniline	240	--	0.7	--	230	--	0.7
Hexachlorobutadiene	6	8	2	--	1	100	1
Caprolactam	--	--	--	--	--	--	--
4-Chloro-3-methylphenol	--	--	--	--	10000	100	100
2-Methylnaphthalene	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	430	10	400	--	400	100	10
2,4,6-Trichlorophenol	44	200	0.2	--	62	10	0.2
2,4,5-Trichlorophenol	6100	--	270	--	5600	50	50
1,1'-Biphenyl	--	--	--	--	--	--	--
2-Chloronaphthalene	--	--	--	--	--	--	--
2-Nitroaniline	--	--	--	--	--	--	--
Dimethylphthalate	--	--	--	--	10000	50	50
2,6-Dinitrotoluene	0.7	--	0.0007	--	1	10	0.0007
Acenaphthylene	--	--	--	--	--	--	--

TABLE 1-2 (Sheet 4 of 7)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
3-Nitroaniline	--	--	--	--	--	--	--
Acenaphthene	3400	--	570	--	3400	100	100
2,4-Dinitrophenol	120	--	0.2	--	110	10	0.2
4-Nitrophenol	--	--	--	--	--	--	--
Dibenzofuran	--	--	--	--	--	--	--
2,4-Dinitrotoluene	0.7	--	0.0008	--	1	10	0.0008
Diethylphthalate	49000	--	470	--	10000	50	50
Fluorene	2300	--	560	--	2300	100	100
4-Chlorophenyl-phenylether	--	--	--	--	--	--	--
4-Nitroaniline	--	--	--	--	--	--	--
4,6-Dinitro-2-methylphenol	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	99	--	1	--	140	100	1
4-Bromophenyl-phenylether	--	--	--	--	--	--	--
Hexachlorobenzene	0.3	1	2	--	0.66	100	0.3
Atrazine	--	--	--	--	--	--	--
Pentachlorophenol	3	--	0.03	--	6	100	0.03
Phenanthrene	--	--	--	--	--	--	--
Anthracene	17000	--	12000	--	10000	100	100
Carbazole	24	--	0.6	--	--	--	0.6
Di-n-butylphthalate	6100	--	2300	--	5700	100	100
Fluoranthene	2300	--	4300	--	2300	100	100
Pyrene	1700	--	4200	--	1700	100	100
Butylbenzylphthalate	12000	--	930	--	1100	100	100
3,3'-Dichlorobenzidine	1	--	0.007	--	2	100	0.007
Benzo(a)anthracene	0.6	--	2	--	0.9	500	0.6
Chrysene	62	--	160	--	9	500	9
bis(2-Ethylhexyl)phthalate	35	--	3600	--	49	100	35

400141

TABLE 1-2 (Sheet 5 of 7)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Di-n-octylphthalate	1200	--	10000	--	1100	100	100
Benzo(b)fluoranthene	0.6	--	5	--	0.9	50	0.6
Benzo(k)fluoranthene	6	--	49	--	0.9	500	0.9
Benzo(a)pyrene	0.06	--	8	--	0.66	100	0.06
Indeno(1,2,3-cd)pyrene	0.6	--	14	--	0.9	500	0.6
Dibenz(a,h)anthracene	0.06	--	2	--	0.66	100	0.06
Benzo(g,h,i)perylene	--	--	--	--	--	--	--
Pesticides/PCBs							
alpha-BHC	0.1	0.7	0.0005	--	--	--	0.0005
beta-BHC	0.4	6	0.003	--	--	--	0.003
delta-BHC	--	--	--	--	--	--	--
gamma-BHC (Lindane)	0.4	--	0.009	--	0.52	50	0.009
Heptachlor	0.1	4	23	--	0.15	50	0.1
Aldrin	0.04	3	0.5	--	0.04	50	0.04
Heptachlor epoxide	0.07	5	0.7	--	--	--	0.07
Endosulfan I	470	--	18	--	340	50	18
Dieldrin	0.04	1	0.004	--	0.042	50	0.004
4,4'-DDE	2	--	54	--	2	50	2
Endrin	23	--	1	--	17	50	1
Endosulfan II	470	--	18	--	340	50	18
4,4'-DDD	3	--	16	--	3	50	3
Endosulfan sulfate	--	--	--	--	--	--	--
4,4'-DDT	2	--	32	--	2	500	2
Methoxychlor	390	--	160	--	280	50	50
Endrin ketone	--	--	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--	--	--
alpha-Chlordane	2	72	10	--	--	--	2

400142

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
gamma-Chlordane	2	72	10	--	--	--	2
Toxaphene	0.6	87	31	--	0.1	50	0.1
Aroclor-1016	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1221	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1232	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1242	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1248	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1254	--	--	--	--	0.49***	50 ***	0.49
Aroclor-1260	--	--	--	--	0.49***	50 ***	0.49
Total PCBs	--	--	--	1**	0.49	50	0.49
Dioxins/Furans							
2,3,7,8-TCDD	--	--	--	0.001**	--	--	0.001
Metals and Cyanide							
Aluminum	--	--	--	--	--	--	--
Antimony	31	--	5	--	14	SS	5
Arsenic	0.4	770	29	--	20	SS	0.4
Barium	5500	710000	1600	--	700	SS	700
Beryllium	160	1400	63	--	2	SS	2
Cadmium	70	1800	8	--	39	SS	8
Calcium	--	--	--	--	--	--	--
Chromium	230****	280****	38****	--	240****	SS	38
Cobalt	--	--	--	--	--	--	--
Copper	--	--	--	--	600	SS	600
Iron	--	--	--	--	--	--	--
Lead	400	400 or --	400	--	400	SS	400
Magnesium	--	--	--	--	--	--	--
Manganese	--	--	--	--	--	--	--

TABLE 1-2 (Sheet 7 of 7)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR SUBSURFACE SOILS

Constituents	EPA Generic Soil Screening Levels (SSLs)* Ingestion/ Direct Contact (mg/kg)	EPA Generic Soil Screening Levels (SSLs)* Inhalation (mg/kg)	EPA Generic Migration to Groundwater 20 DAF (mg/kg)	Superfund Guidance Values** (mg/kg)	NJDEP Soil Cleanup Criteria Residential Direct Contact (mg/kg)	NJDEP Soil Cleanup Criteria Impact to Groundwater (mg/kg)	Most Conservative Screening Criteria Value (mg/kg)
Mercury	23	10	2	--	14	SS	2
Nickel	1600	14000	130	--	250	SS	130
Potassium	--	--	--	--	--	--	--
Selenium	390	--	5	--	63	SS	5
Silver	390	--	34	--	110	SS	34
Sodium	--	--	--	--	--	--	--
Thallium	6	--	0.7	--	2	SS	0.7
Vanadium	550	--	6000	--	370	SS	370
Zinc	23000	--	12000	--	1500	SS	1500
Cyanide	1600	--	40	v	1100	SS	40

Notes:
All soil criteria values are provided in mg/kg.
DAF = Dilution Attenuation Factor.
SS = Site-specific.
-- = No criterion value available.
* = SSLs provided directly from guidance document; in Section 6.0, screening criteria updated using latest toxicity information.
** = Criteria values are for residential soil and were provided by EPA Region 2 (EPA, 2002a). Industrial soil criteria are 10 mg/kg and 0.005 mg/kg for PCBs and 2,3,7,8-TCDD, respectively.
*** = Criteria values correspond to sum of all PCBs.
**** = Criteria values correspond to total (if available) or hexavalent chromium.
(1) = Also known as methyl chloride.
(2) = Also known as methyl ethyl ketone (MEK).
(3) = Also known as methyl isobutyl ketone (MIBK).
(4) = Also known as 1-methyl ethyl benzene.

400144

TABLE 1-3 (Sheet 1 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR PERCHED WATER

Constituents	EPA Drinking Water Regulations (MCLs) (ug/L)	NJDEP Safe Drinking Water Act Standards (MCLs) (ug/L)	NJDEP Groundwater Quality Criteria (Class IIA) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Volatile Organics				
Chloromethane (1)	--	--	30	30
Bromomethane	--	--	10	10
Vinyl Chloride	2	2	5	2
Chloroethane	--	--	100 **	100
Methylene Chloride	5	3	3 **	3
Acetone	--	--	700	700
Carbon Disulfide	--	--	800 **	800
1,1-Dichloroethene	7	2	2	2
1,1-Dichloroethane	--	50	50 **	50
cis-1,2-Dichloroethene	70	70	70 **	70
trans-1,2-Dichloroethene	100	100	100	100
1,2-Dichloroethene (total)	70	70	10	10
Bromochloromethane	--	--	100 *	100
Chloroform	100	--	6	6
1,2-Dichloroethane	5	2	2	2
2-Butanone (2)	--	--	300	300
1,1,1-Trichloroethane	200	30	30	30
Carbon Tetrachloride	5	2	2	2
Bromodichloromethane	80	--	1	1
1,2-Dichloropropane	5	5	1	1
cis-1,3-Dichloropropene	--	--	0.2	0.2
Trichloroethene	5	1	1	1
Dibromochloromethane	80	--	10	10
1,1,2-Trichloroethane	5	3 **	3	3
Benzene	5	1	1	1
trans-1,3-Dichloropropene	--	--	0.2	0.2
Bromoform	80	--	4	4
4-Methyl-2-Pentanone (3)	--	--	400	400
2-Hexanone	--	--	100 **	100
Tetrachloroethene	5	1	1	1
1,1,2,2-Tetrachloroethane	--	1	1 **	1
1,2-Dibromoethane	--	--	0.05	0.05
Toluene	1000	1000	1000	1000
Chlorobenzene	100	50	50	50
Ethylbenzene	700	700	700	700
Styrene	100	100	100	100
m&p-Xylenes	--	1000	100 *	100
o-Xylene	--	1000	100 *	100
Xylenes (total)	10000	1000 **	1000	1000
1,3-Dichlorobenzene	--	600	600	600
1,4-Dichlorobenzene	75	75	75	75
1,2-Dichlorobenzene	600	600	600	600
1,2-Dibromo-3-chloropropane	0.2	--	1 **	0.2
1,2,4-Trichlorobenzene	70	9	9	9

TABLE 1-3 (Sheet 2 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR PERCHED WATER

Constituents	EPA Drinking Water Regulations (MCLs) (ug/L)	NJDEP Safe Drinking Water Act Standards (MCLs) (ug/L)	NJDEP Groundwater Quality Criteria (Class IIA) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Semi-Volatile Organics				
Phenol	--	--	4000	4000
bis(2-Chloroethyl) ether	--	--	10	10
2-Chlorophenol	--	--	40	40
2-Methylphenol	--	--	100 *	100
2,2'-oxybis(1-Chloropropane)	--	--	300 **	300
4-Methylphenol	--	--	100 *	100
N-Nitroso-di-n-propylamine	--	--	20	20
Hexachloroethane	--	--	10	10
Nitrobenzene	--	--	10	10
Isophorone	--	--	100	100
2-Nitrophenol	--	--	100 **	100
2,4-Dimethylphenol	--	--	100	100
bis(2-Chloroethoxy)methane	--	--	100 **	100
2,4-Dichlorophenol	--	--	20	20
Naphthalene	--	300	300 **	300
4-Chloroaniline	--	--	30 ***	30
Hexachlorobutadiene	--	--	1	1
4-Chloro-3-methylphenol	--	--	100 **	100
2-Methylnaphthalene	--	--	100 **	100
Hexachlorocyclopentadiene	50	50	50	50
2,4,6-Trichlorophenol	--	--	20	20
2,4,5-Trichlorophenol	--	--	700	700
2-Chloronaphthalene	--	--	600 **	600
2-Nitroaniline	--	--	100 *	100
Dimethylphthalate	--	--	100 *	100
Acenaphthylene	--	--	100 *	100
2,6-Dinitrotoluene	--	--	100 *	100
3-Nitroaniline	--	--	100 *	100
Acenaphthene	--	--	400	400
2,4-Dinitrophenol	--	--	40	40
4-Nitrophenol	--	--	100 **	100
Dibenzofuran	--	--	100 **	100
2,4-Dinitrotoluene	--	--	10	10
Diethylphthalate	--	--	5000	5000
4-Chlorophenyl-phenylether	--	--	100 **	100
Fluorene	--	--	300	300
4-Nitroaniline	--	--	100 *	100
4,6-Dinitro-2-methylphenol	--	--	100 **	100
N-Nitrosodiphenylamine	--	--	20	20
4-Bromophenyl-phenylether	--	--	100 *	100
Hexachlorobenzene	1	1	10	1
Pentachlorophenol	1	1	1	1
Phenanthrene	--	--	100 **	100
Anthracene	--	--	2000	2000

TABLE 1-3 (Sheet 3 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR PERCHED WATER

Constituents	EPA Drinking Water Regulations (MCLs) (ug/L)	NJDEP Safe Drinking Water Act Standards (MCLs) (ug/L)	NJDEP Groundwater Quality Criteria (Class IIA) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Carbazole	--	--	100 *	100
Di-n-butylphthalate	--	--	900	900
Fluoranthene	--	--	300	300
Pyrene	--	--	200	200
Butylbenzylphthalate	--	--	100	100
3,3'-Dichlorobenzidine	--	--	60	60
Benzo(a)anthracene	--	--	0.2 **	0.2
Chrysene	--	--	5 **	5
bis(2-Ethylhexyl)phthalate	6	--	30	6
Di-n-octylphthalate	--	--	100	100
Benzo(b)fluoranthene	--	--	10 **	10
Benzo(k)fluoranthene	--	--	1 **	1
Benzo(a)pyrene	0.2	0.2	0.2 **	0.2
Indeno(1,2,3-cd)pyrene	--	--	10 **	10
Dibenz(a,h)anthracene	--	--	0.5 **	0.5
Benzo(g,h,i)perylene	--	--	100 **	100
Pesticides/PCBs				
alpha-BHC	--	--	0.02	0.02
beta-BHC	--	--	0.2	0.2
delta-BHC	--	--	100 *	100
gamma-BHC (Lindane)	0.2	0.2	0.2	0.2
Heptachlor	0.4	0.4	0.4	0.4
Aldrin	--	--	0.04	0.04
Heptachlor epoxide	0.2	0.2	0.2	0.2
Endosulfan I	--	--	0.4	0.4
Dieldrin	--	--	0.03	0.03
4,4'-DDE	--	--	0.1	0.1
Endrin	2	2	2	2
Endosulfan II	--	--	0.4	0.4
4,4'-DDD	--	--	0.1	0.1
Endosulfan sulfate	--	--	0.4	0.4
4,4'-DDT	--	--	0.1	0.1
Methoxychlor	40	40	40	40
Endrin ketone	--	--	100 *	100
Endrin aldehyde	--	--	100 *	100
alpha-Chlordane	2	0.5	0.5	0.5
gamma-Chlordane	2	0.5	0.5	0.5
Toxaphene	3	3	3	3
Aroclor-1016	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1221	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1232	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1242	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1248	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1254	0.5 ***	0.5 ***	0.5 ***	0.5
Aroclor-1260	0.5 ***	0.5 ***	0.5 ***	0.5

TABLE 1-3 (Sheet 4 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR PERCHED WATER

Constituents	EPA Drinking Water Regulations (MCLs) (ug/L)	NJDEP Safe Drinking Water Act Standards (MCLs) (ug/L)	NJDEP Groundwater Quality Criteria (Class IIA) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Total PCBs	0.5	0.5	0.5	0.5
Dioxins/Furans				
2,3,7,8-TCDD	0.00003	0.00003	0.01	0.00003
Metals				
Aluminum	50-200 ****	200	200	200
Antimony	6	6	20	6
Arsenic	10	50	8	8
Barium	2000	2000	2000	2000
Beryllium	4	4	20	4
Cadmium	5	5	4	4
Calcium	--	--	--	--
Chromium	100	100	100	100
Cobalt	--	--	100 **	100
Copper	1300	1300	1000	1000
Iron	300 ****	300	300	300
Lead	15	15	10	10
Magnesium	--	--	--	--
Manganese	50 ****	50	50	50
Mercury	2	2	2	2
Nickel	--	--	100	100
Potassium	--	--	--	--
Selenium	50	50	50	50
Silver	100 ****	100	30 **	30
Sodium	--	--	50000	50000
Thallium	2	2	10	2
Vanadium	--	--	--	--
Zinc	5000 ****	5000	5000	5000
Cyanide	200	--	200	200

Notes:
All groundwater criteria are provided in ug/L.
Criteria provided for 1,2-dichloroethene (total) are the most conservative values for the cis- and trans-isomers.
Criteria provided for alpha-chlordane and gamma-chlordane are the values for chlordane.
-- indicates no criterion value available.
* indicates criterion value corresponds to NJDEP Interim Generic "Synthetic Organic Chemicals (SOC) Criteria" for carcinogenic (5 ug/L) and non-carcinogenic (100 ug/L) constituents.
** indicates criterion value corresponds to NJDEP "Interim Specific Groundater Quality Criteria."
*** indicates criterion value corresponds to the sum of all PCBs.
**** indicates criterion value corresponds to EPA "Secondary Drinking Water Regulations."
(1) Also known as methyl chloride.
(2) Also known as methyl ethyl ketone (MEK).
(3) Also known as methyl isobutyl ketone (MIBK).

TABLE 1-4 (Sheet 1 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR DRAINAGE SYSTEM WATER

Constituents	NJDEP Surface Water Quality Standards (Aquatic) (ug/L)	NJDEP Surface Water Quality Standards (Human Health) (ug/L)	EPA Water Quality Criteria (Freshwater) (ug/L)	EPA Water Quality Criteria (Human Health) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Volatile Organics					
Chloromethane (1)	--	--	--	--	--
Bromomethane	--	48.4	--	48	48
Vinyl Chloride	--	0.083	--	2	0.083
Chloroethane	--	--	--	--	--
Methylene Chloride	--	2.49	--	4.7	2.49
Acetone	--	--	--	--	--
Carbon Disulfide	--	--	--	--	--
1,1-Dichloroethene	--	4.81	--	0.057	0.057
1,1-Dichloroethane	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	--	--
trans-1,2-Dichloroethene	--	592	--	700	592
Chloroform	--	5.67	--	5.7	5.67
1,2-Dichloroethane	--	0.291	--	0.38	0.291
2-Butanone (2)	--	--	--	--	--
Bromochloromethane	--	--	--	--	--
1,1,1-Trichloroethane	--	127	--	--	127
Carbon Tetrachloride	--	0.363	--	0.25	0.25
Bromodichloromethane	--	0.266	--	0.56	0.266
1,2-Dichloropropane	--	--	--	0.52	0.52
cis-1,3-Dichloropropene	--	0.193	--	10	0.193
Trichloroethene	--	1.09	--	2.7	1.09
Dibromochloromethane	--	72.6	--	0.41	0.41
1,1,2-Trichloroethane	--	13.5	--	0.6	0.6
Benzene	--	0.15	--	1.2	0.15
trans-1,3-Dichloropropene	--	0.193	--	10	0.193
Bromoform	--	4.38	--	4.3	4.3
4-Methyl-2-Pentanone (3)	--	--	--	--	--
2-Hexanone	--	--	--	--	--
Tetrachloroethene	--	0.388	--	0.8	0.388
1,1,2,2-Tetrachloroethane	--	1.72	--	0.17	0.17
1,2-Dibromoethane	--	--	--	--	--
Toluene	--	7440	--	6800	6800
Chlorobenzene	--	22	--	680	680
Ethylbenzene	--	3030	--	3100	3030
Styrene	--	--	--	--	--
Xylenes (total)	--	--	--	--	--
1,3-Dichlorobenzene	--	2620	--	400	400
1,4-Dichlorobenzene	--	343	--	400	400
1,2-Dichlorobenzene	--	2520	--	2700	2520
1,2-Dibromo-3-chloropropane	--	--	--	--	--
1,2,4-Trichlorobenzene	--	30.6	--	260	30.6

TABLE 1-4 (Sheet 2 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR DRAINAGE SYSTEM WATER

Constituents	NJDEP Surface Water Quality Standards (Aquatic) (ug/L)	NJDEP Surface Water Quality Standards (Human Health) (ug/L)	EPA Water Quality Criteria (Freshwater) (ug/L)	EPA Water Quality Criteria (Human Health) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Semi-Volatile Organics					
Phenol	--	20900	--	21000	20900
bis(2-Chloroethyl) ether	--	0.0311	--	0.031	0.031
2-Chlorophenol	--	122	--	120	120
2-Methylphenol	--	--	--	--	--
2,2'-oxybis(1-Chloropropane)	--	1250	--	1400	1250
4-Methylphenol	--	--	--	--	--
N-Nitroso-di-n-propylamine	--	--	--	0.005	0.005
Hexachloroethane	--	2.73	--	1.9	1.9
Nitrobenzene	--	16	--	17	16
Isophorone	--	552	--	36	36
2-Nitrophenol	--	--	--	--	--
2,4-Dimethylphenol	--	--	--	540	540
bis(2-Chloroethoxy)methane	--	--	--	--	--
2,4-Dichlorophenol	--	92.7	--	93	92.7
Naphthalene	--	--	--	--	--
4-Chloroaniline	--	--	--	--	--
Hexachlorobutadiene	--	6.94	--	0.44	0.44
4-Chloro-3-methylphenol	--	--	--	--	--
2-Methylnaphthalene	--	--	--	--	--
Hexachlorocyclopentadiene	--	245	--	240	240
2,4,6-Trichlorophenol	--	2.14	--	2.1	2.1
2,4,5-Trichlorophenol	--	2580	--	2600	2580
2-Chloronaphthalene	--	--	--	1700	1700
2-Nitroaniline	--	--	--	--	--
Dimethylphthalate	--	313000	--	313000	313000
Acenaphthylene	--	--	--	--	--
2,6-Dinitrotoluene	--	--	--	--	--
3-Nitroaniline	--	--	--	--	--
Acenaphthene	--	--	--	1200	1200
2,4-Dinitrophenol	--	69.7	--	70	69.7
4-Nitrophenol	--	--	--	--	--
Dibenzofuran	--	--	--	--	--
2,4-Dinitrotoluene	--	0.11	--	0.11	0.11
Diethylphthalate	--	21200	--	23000	21200
4-Chlorophenyl-phenylether	--	--	--	--	--
Fluorene	--	1340	--	1300	1300
4-Nitroaniline	--	--	--	--	--
4,6-Dinitro-2-methylphenol	--	13.4	--	13.4	13.4
N-Nitrosodiphenylamine	--	4.95	--	5	4.95
4-Bromophenyl-phenylether	--	--	--	--	--
Hexachlorobenzene	--	0.000748	--	0.00075	0.000748
Pentachlorophenol	--	0.282	15	0.28	0.28
Phenanthrene	--	--	--	--	--

TABLE 1-4 (Sheet 3 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR DRAINAGE SYSTEM WATER

Constituents	NJDEP Surface Water Quality Standards (Aquatic) (ug/L)	NJDEP Surface Water Quality Standards (Human Health) (ug/L)	EPA Water Quality Criteria (Freshwater) (ug/L)	EPA Water Quality Criteria (Human Health) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Anthracene	--	9570	--	9600	9570
Di-n-butylphthalate	--	3530	--	2700	2700
Fluoranthene	--	310	--	300	300
Pyrene	--	797	--	960	797
Butylbenzylphthalate	--	239	--	3000	239
3,3'-Dichlorobenzidine	--	0.0386	--	0.04	0.0386
Benzo(a)anthracene	--	0.0028	--	0.0044	0.0028
Chrysene	--	0.0028	--	0.0044	0.0028
bis(2-Ethylhexyl)phthalate	--	1.76	--	1.8	1.76
Di-n-octylphthalate	--	--	--	--	--
Benzo(b)fluoranthene	--	0.0028	--	0.0044	0.0028
Benzo(k)fluoranthene	--	0.0028	--	0.0044	0.0028
Benzo(a)pyrene	--	0.0028	--	0.0044	0.0028
Indeno(1,2,3-cd)pyrene	--	0.0028	--	0.0044	0.0028
Dibenz(a,h)anthracene	--	0.0028	--	0.0044	0.0028
Benzo(g,h,i)perylene	--	--	--	--	--
Pesticides/PCBs					
alpha-BHC	--	0.00391	--	0.0039	0.0039
beta-BHC	--	0.137	--	0.014	0.014
delta-BHC	--	--	--	--	--
gamma-BHC (Lindane)	0.08	--	0.16	0.019	0.019
Heptachlor	0.0038	0.000208	0.0038	0.00021	0.000208
Aldrin	3	0.000135	1.3	0.00013	0.00013
Heptachlor epoxide	0.0038	0.000103	0.0038	0.0001	0.0001
Endosulfan I	0.056	0.932	0.056	110	0.056
Dieldrin	0.0019	0.000135	0.056	0.00014	0.000135
4,4'-DDE	--	0.000588	--	0.00059	0.000588
Endrin	0.0023	0.629	0.036	0.76	0.0023
Endosulfan II	0.056	0.932	0.056	110	0.056
4,4'-DDD	--	0.000832	--	0.00083	0.00083
Endosulfan sulfate	--	0.93	--	110	0.93
4,4'-DDT	0.001	0.000588	0.001	0.00059	0.000588
Methoxychlor	0.03	40	0.03	100	0.03
Endrin ketone	--	--	--	--	--
Endrin aldehyde	--	0.76	--	0.76	0.76
alpha-Chlordane	0.0043	0.000277	0.0043	0.0021	0.000277
gamma-Chlordane	0.0043	0.000277	0.0043	0.0021	0.000277
Toxaphene	0.0002	0.00073	0.0002	0.00073	0.0002
Aroclor-1016	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1221	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1232	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1242	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1248	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1254	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Aroclor-1260	0.014 *	0.00017 *	0.014 *	0.00017 *	0.00017
Total PCBs	0.014	0.00017	0.014	0.00017 *	0.00017

TABLE 1-4 (Sheet 4 of 4)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
SCREENING CRITERIA FOR DRAINAGE SYSTEM WATER

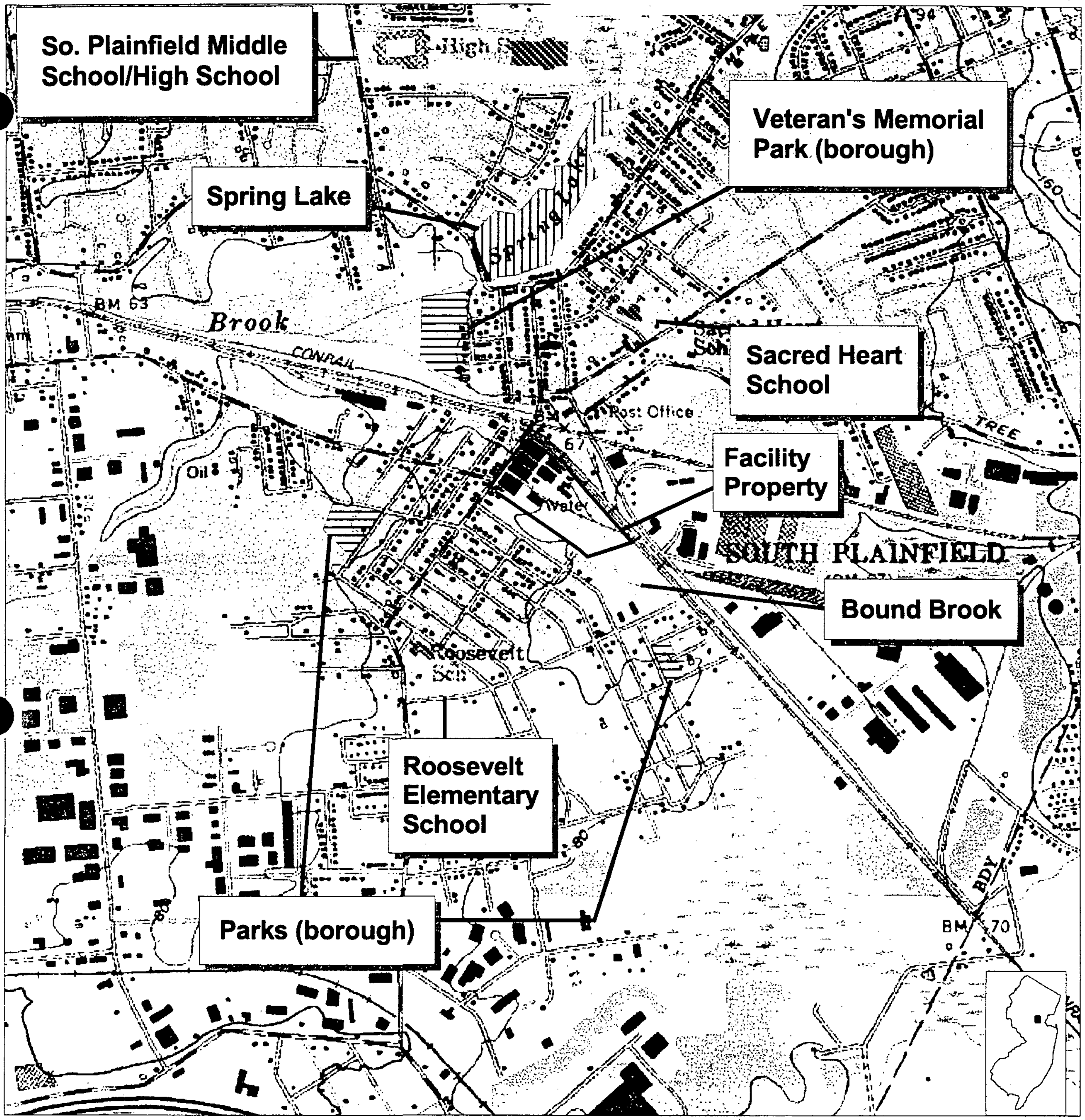
Constituents	NJDEP Surface Water Quality Standards (Aquatic) (ug/L)	NJDEP Surface Water Quality Standards (Human Health) (ug/L)	EPA Water Quality Criteria (Freshwater) (ug/L)	EPA Water Quality Criteria (Human Health) (ug/L)	Most Conservative Screening Criteria Value (ug/L)
Metals and Cyanide					
Aluminum	--	--	87	--	87
Antimony	--	12.2	--	14	12.2
Arsenic	--	0.017	150	0.018	0.017
Barium	--	2000	--	1000	1000
Beryllium	--	--	--	--	--
Cadmium	--	10	2.2	--	2.2
Calcium	--	--	--	--	--
Chromium	--	160	74 **	--	74
Cobalt	--	--	--	--	--
Copper	--	--	9	1300	9
Iron	--	--	1000	300	300
Lead	5.4	5	2.5	--	2.5
Magnesium	--	--	--	--	--
Manganese	--	100	--	50	50
Mercury	--	0.144	0.77	0.05	0.05
Nickel	--	516	52	610	52
Potassium	--	--	--	--	--
Selenium	--	10	5	170	5
Silver	--	164	3.4	--	3.4
Sodium	--	--	--	--	--
Thallium	--	1.7	--	1.7	1.7
Vanadium	--	--	--	--	--
Zinc	--	--	120	9100	120
Cyanide	5.2	768	5.2	700	5.2

Notes:

All surface water values are provided in ug/L.
-- indicates no criteria value available.
* indicates criterion value corresponds to the sum of all PCBs.
** indicates criterion value corresponds to trivalent chromium (Cr+3).
(1) Also known as methyl chloride.
(2) Also known as methyl ethyl ketone (MEK)
(3) Also known as methyl isobutyl ketone (MIBK).

SECTION 1

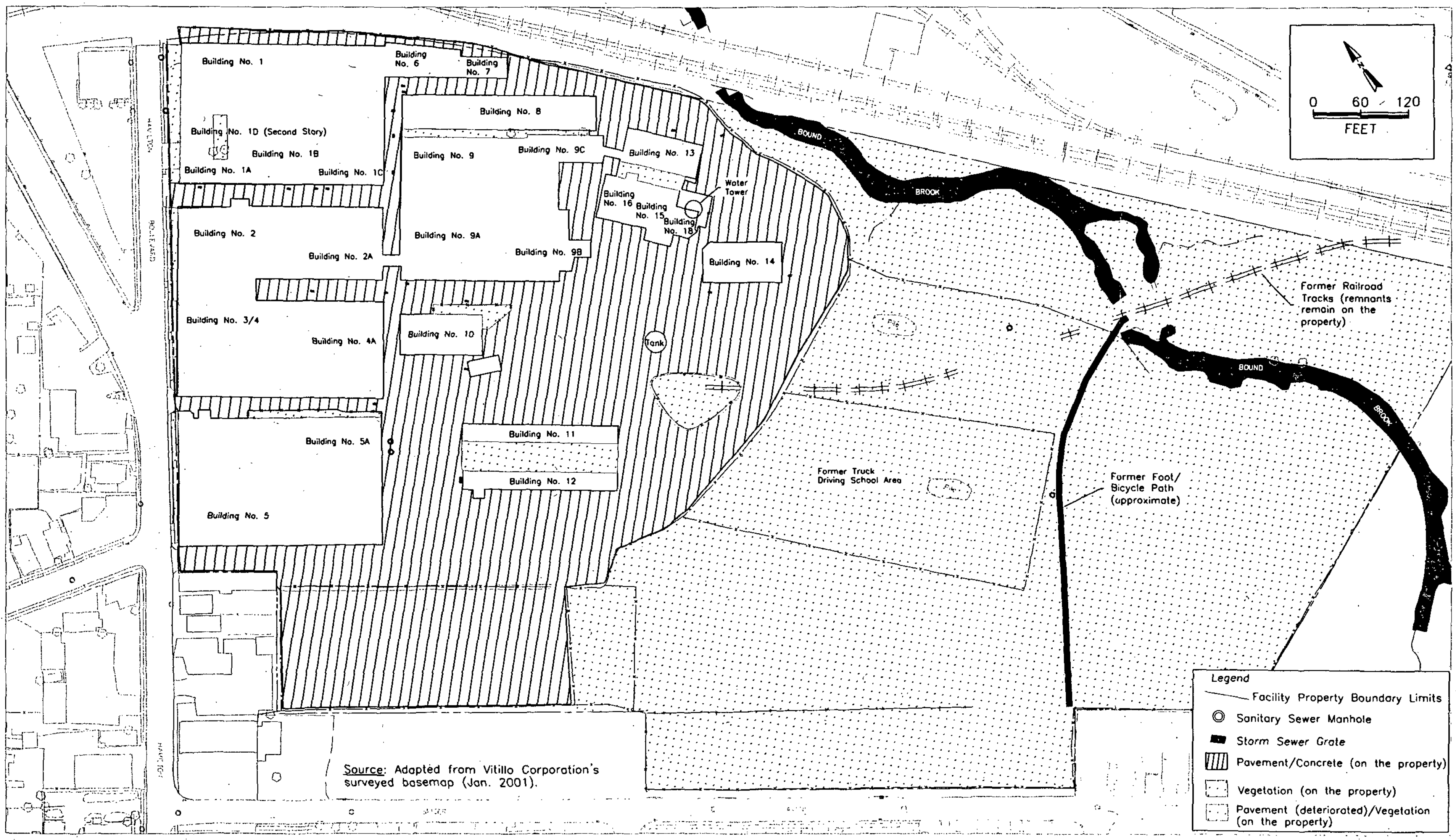
FIGURES



Source: US Geological Survey 7.5-minute topographic map for Plainfield, New Jersey.

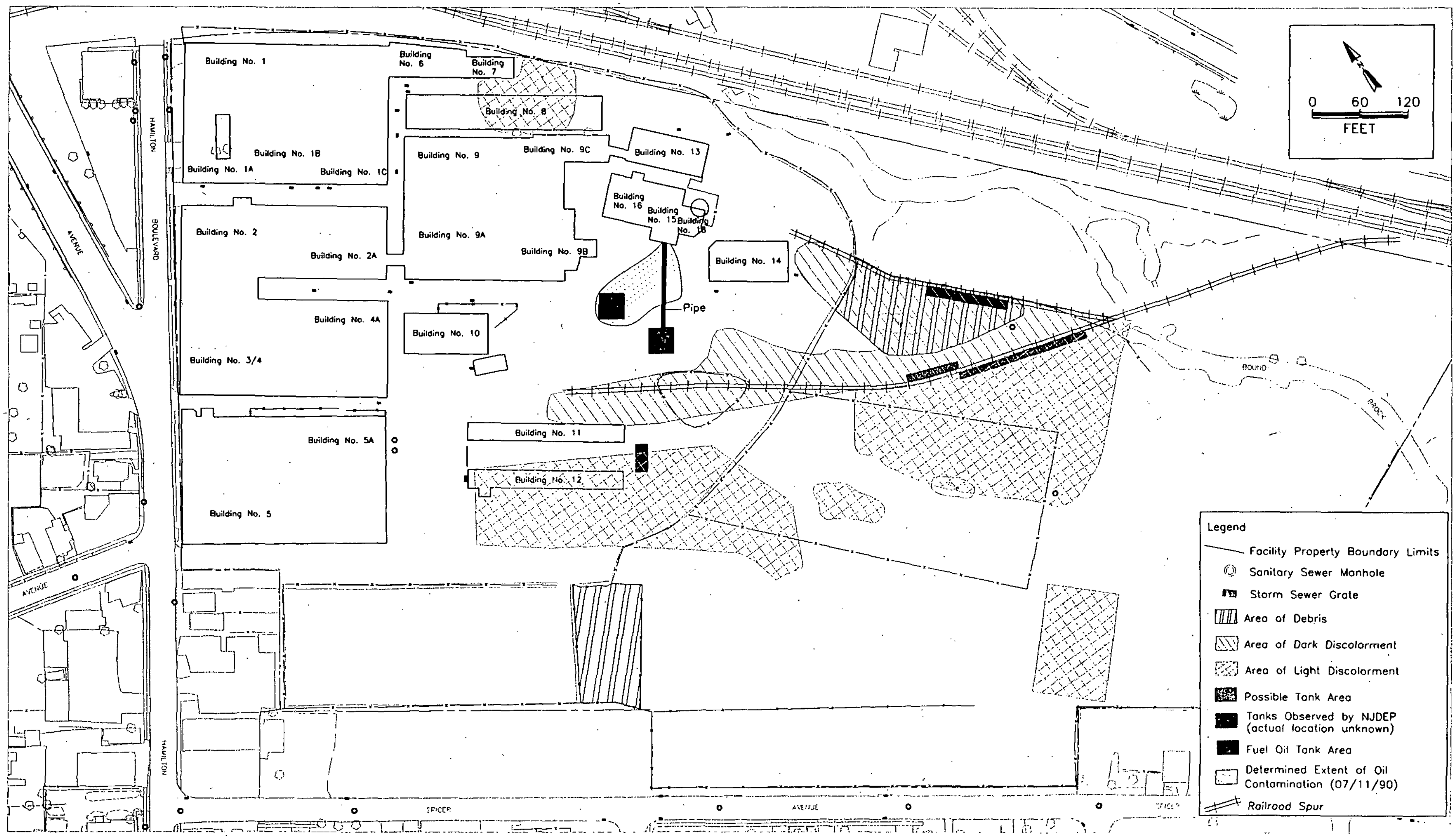
Scale: 1: 25000

TETRA TECH FW, INC.	Title: Site Location Map Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: CTS CHKD: GJ DATE: 03/29/04	DES.: LEN APPD: LH REV.: 3	Project No. 1945.2118 Figure No. 1-1



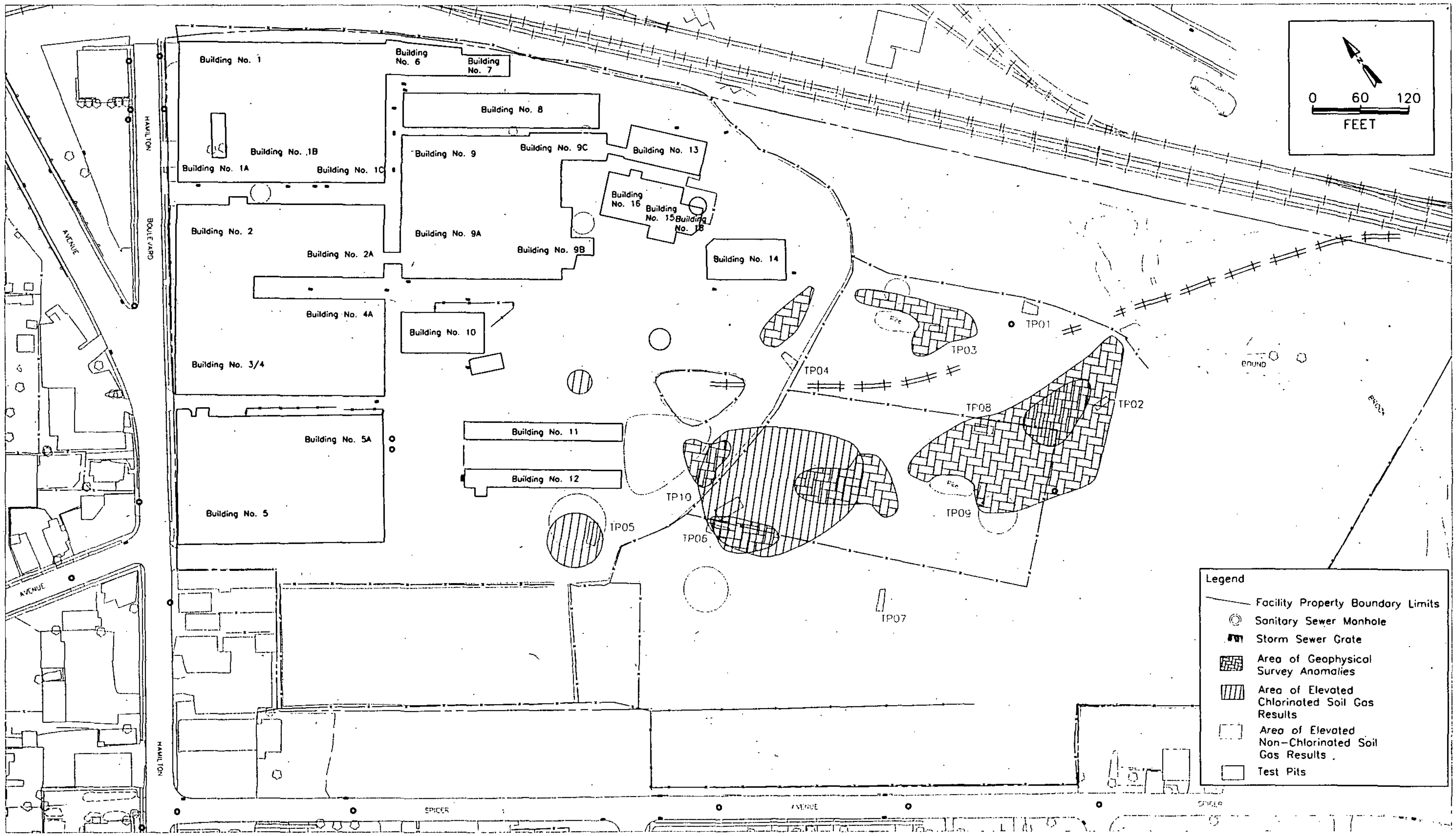
400155

TETRA TECH FW, INC.	TITLE: Facility Property Map Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN.: CTS CHKD: GJ DES.: LEN	DATE: 03/29/04 REV.: 2 APPD: LH	PROJECT NO.: 1945.2118 FIGURE NO.: 1-2



400156

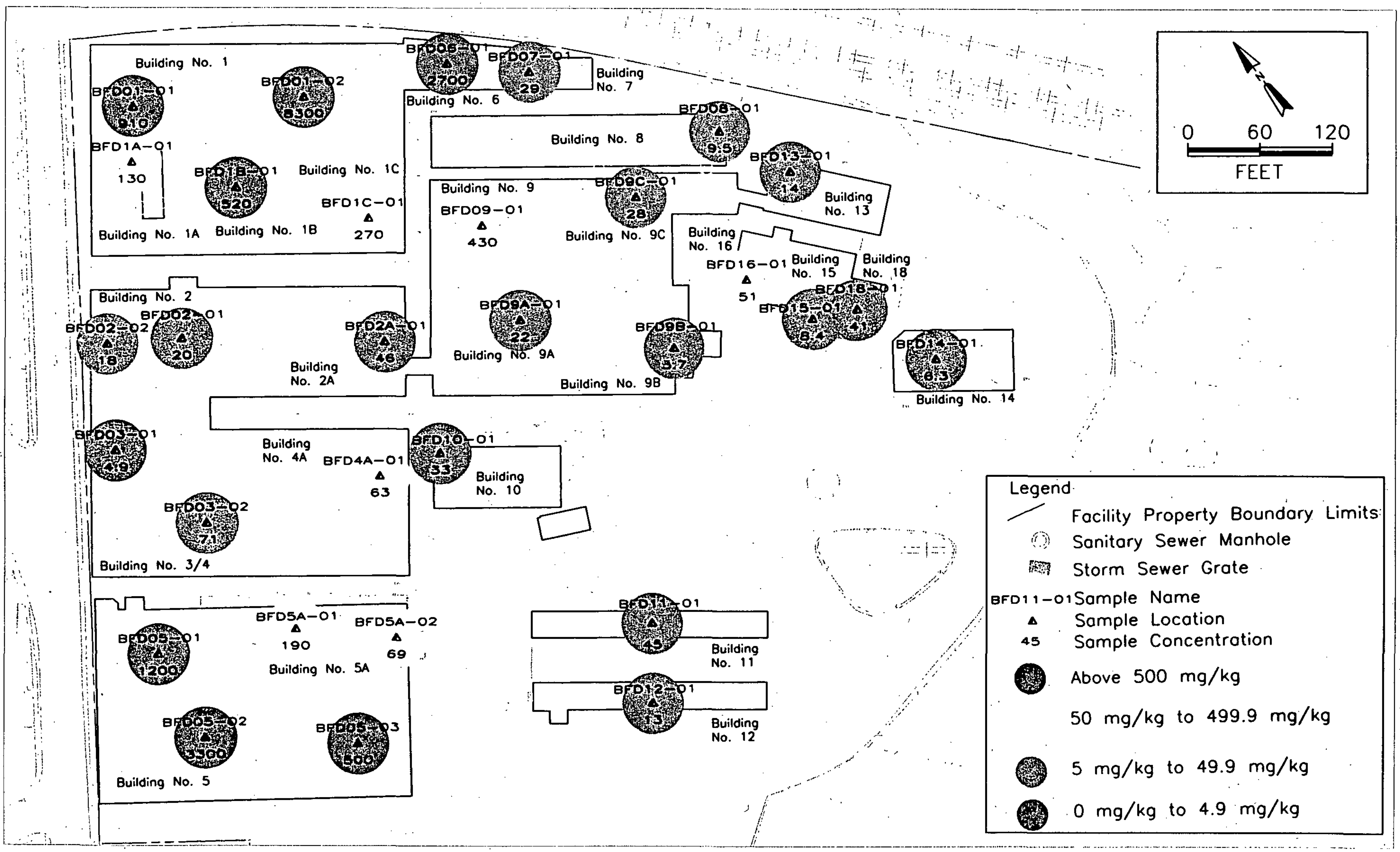
TETRA TECH FW, INC.	TITLE: Possible Source Areas from Historic Information Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118
		CHKD.: JG	REV.: 1	FIGURE NO.: 1-3
		DES.: LEN	APPD.: LH	



400157

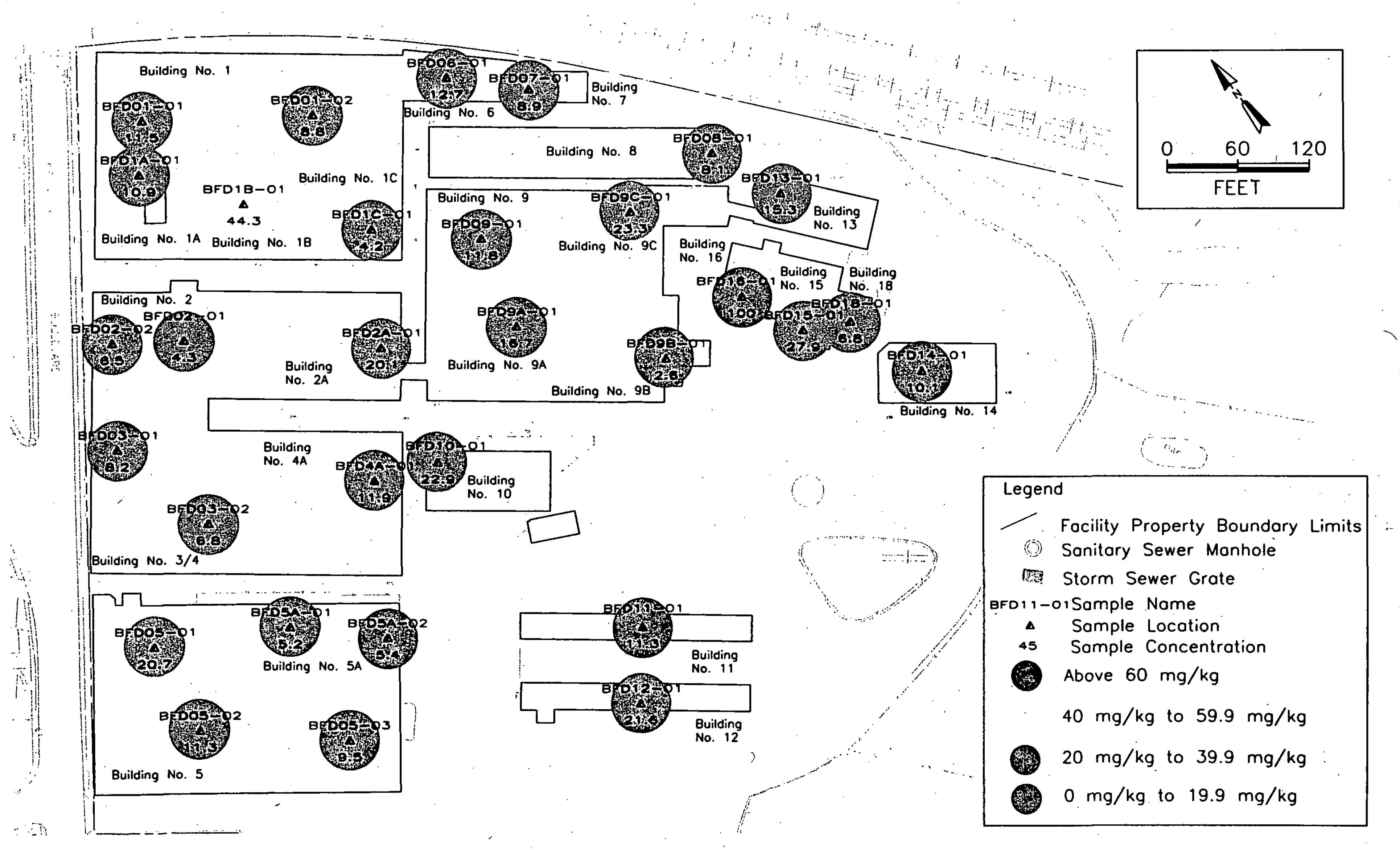
TETRA TECH FW, INC.	TITLE: Possible Source Areas from OU-2 RI Investigation Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN.: CTS CHKD: JG DES.: LEN	DATE: 03/29/04 REV.: 1 APPD: LH	PROJECT NO.: 1945.2118 FIGURE NO.: 1-4

400158



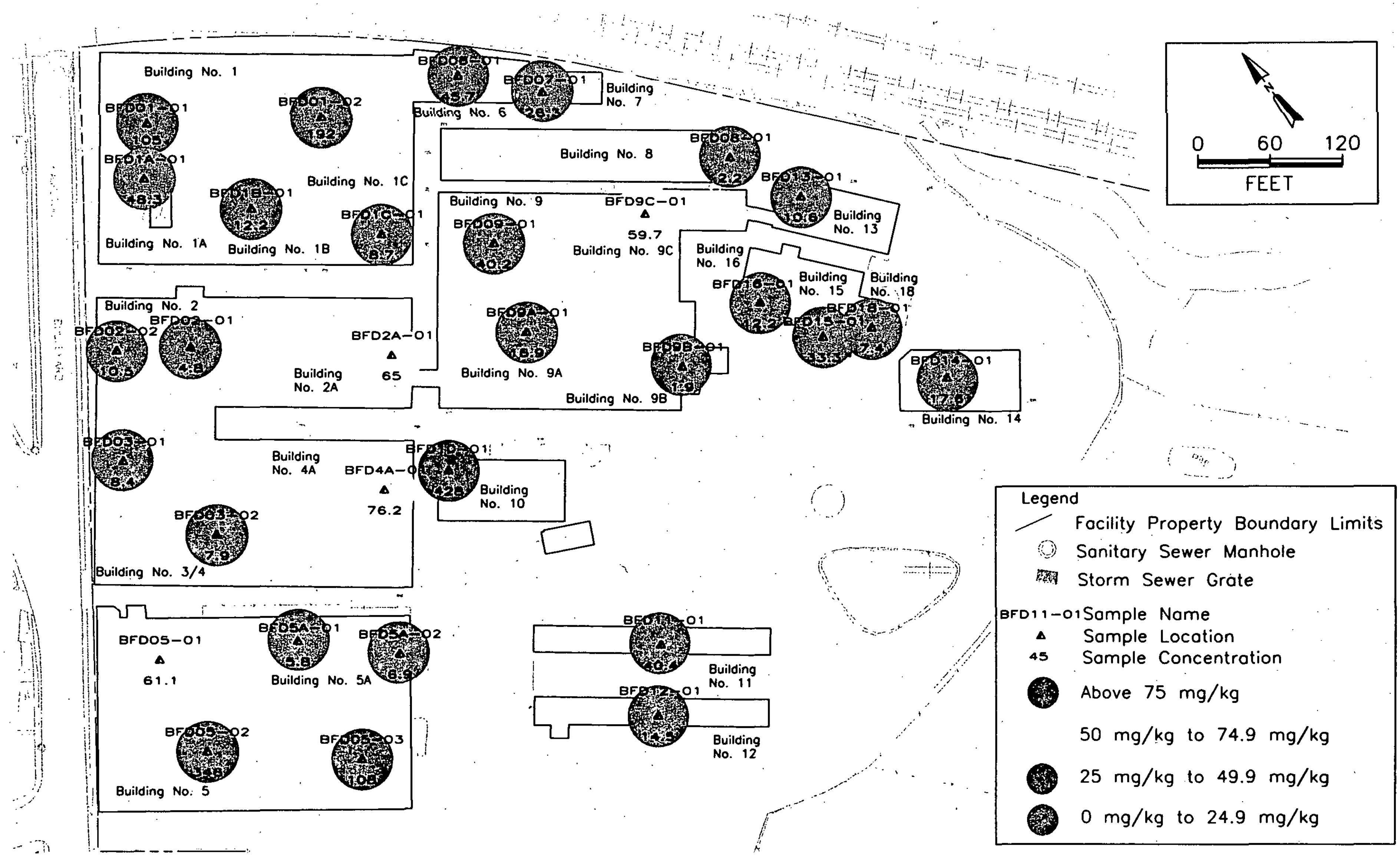
TETRA TECH FW, INC.	TITLE: Concentration of Total PCBs in Building Floor Dust Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: LEN	DES.: LEN	PROJECT NO.: 1945.2118
		CHKD: JG	APPD: LH	
		DATE: 03/29/04	REV.: 1	FIGURE NO.: 1-5

400159



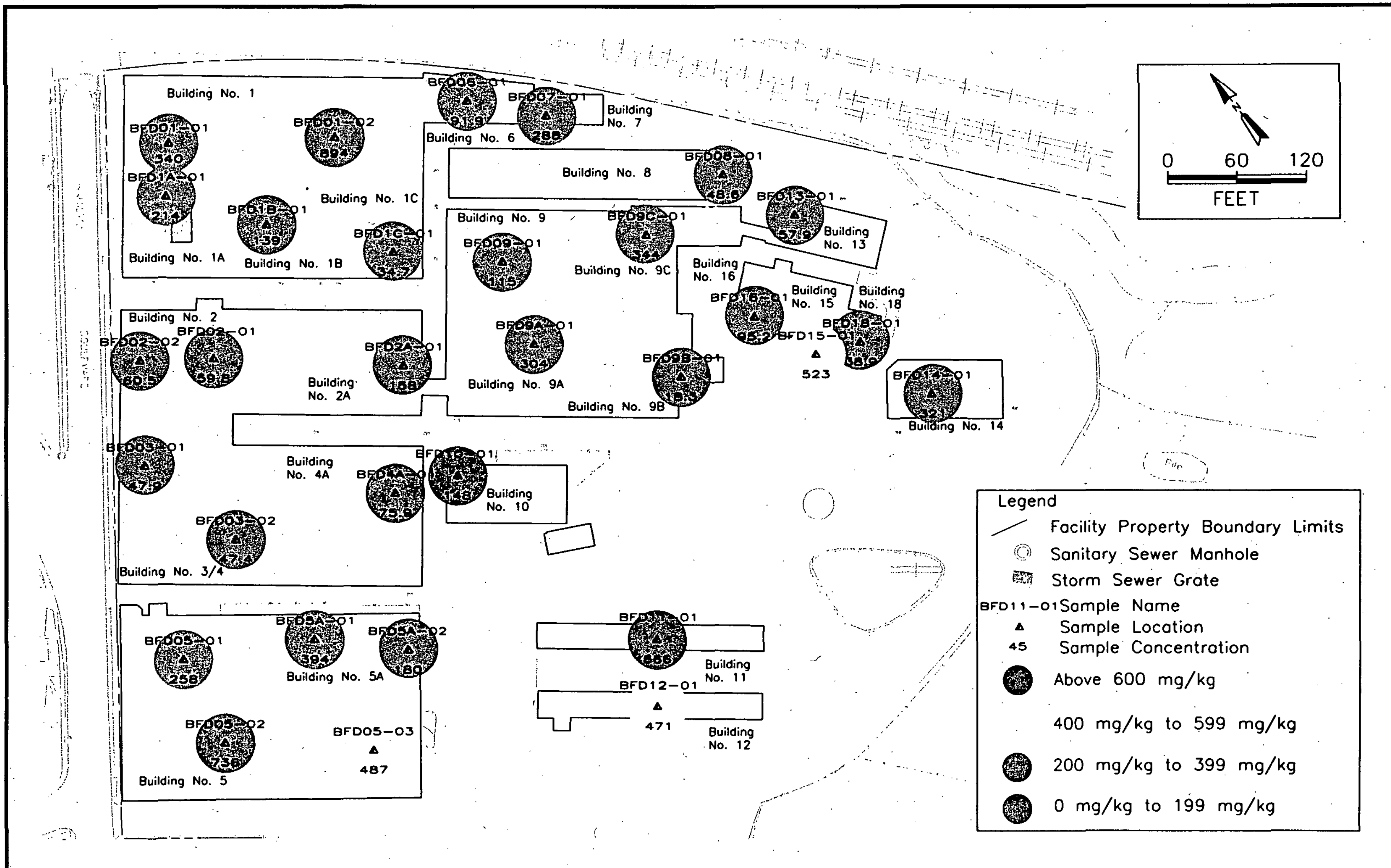
TETRA TECH FW, INC.	TITLE: Concentration of Arsenic in Building Floor Dust Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: LEN CHKD: JG DATE: 03/29/04	DES.: LEN APPD: LH REV.: 1	PROJECT NO.: 1945.2118 FIGURE NO.: 1-6

400160

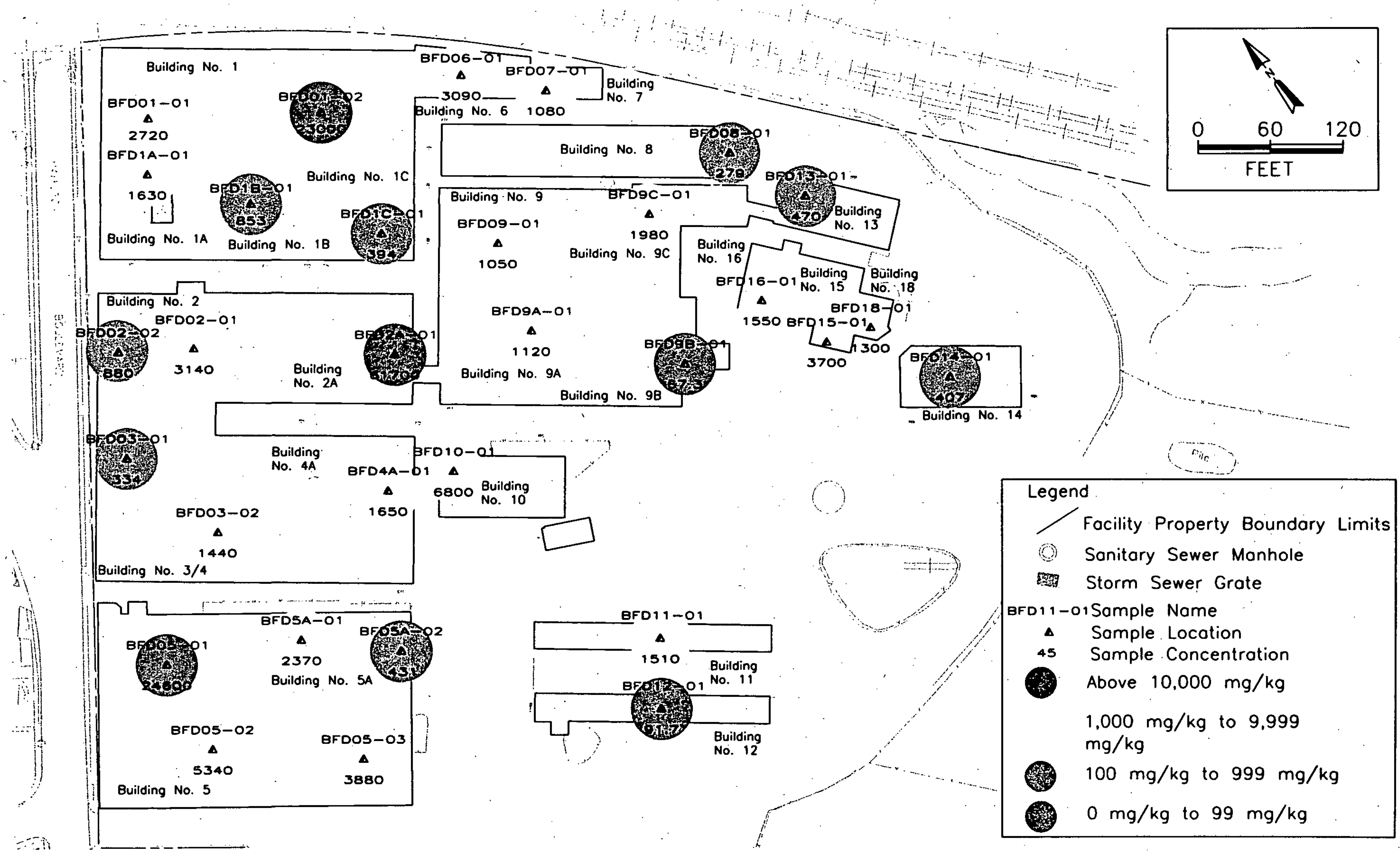


TETRA TECH FW, INC.	TITLE: Concentration of Cadmium in Building Floor Dust Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: LEN	DES.: LEN	PROJECT NO.: 1945.2118
		CHKD: JG	APPD: LH	FIGURE NO.: 1-7
		DATE: 03/29/04	REV.: 1	

400161



TETRA TECH FW, INC.	TITLE: Concentration of Chromium in Building Floor Dust Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: LEN	DES.: LEN	PROJECT NO.: 1945.2118
		CHKD: JG	APPD: LH	
		DATE: 03/29/04	REV.: 1	FIGURE NO.: 1-8

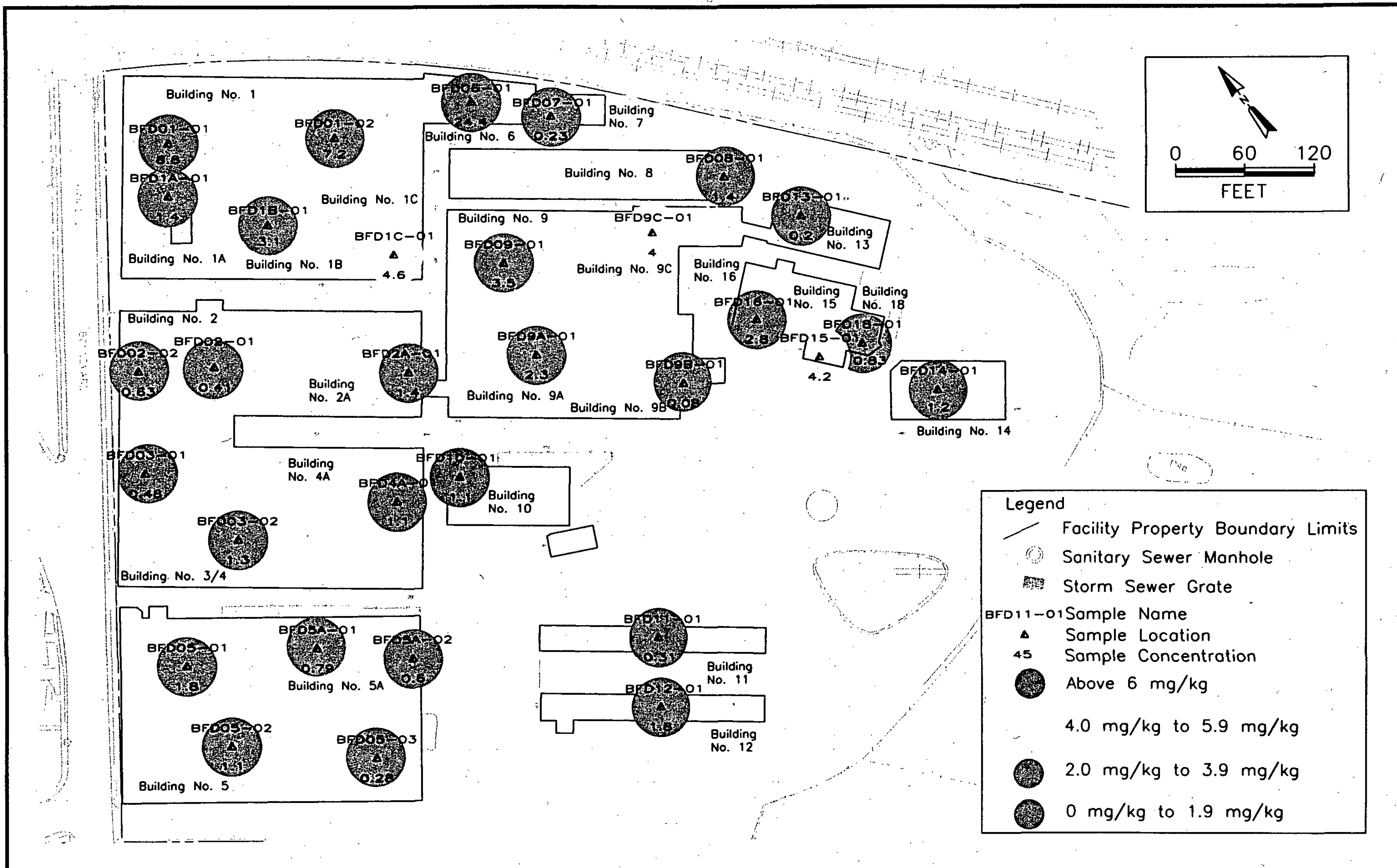


TETRA TECH FW, INC.

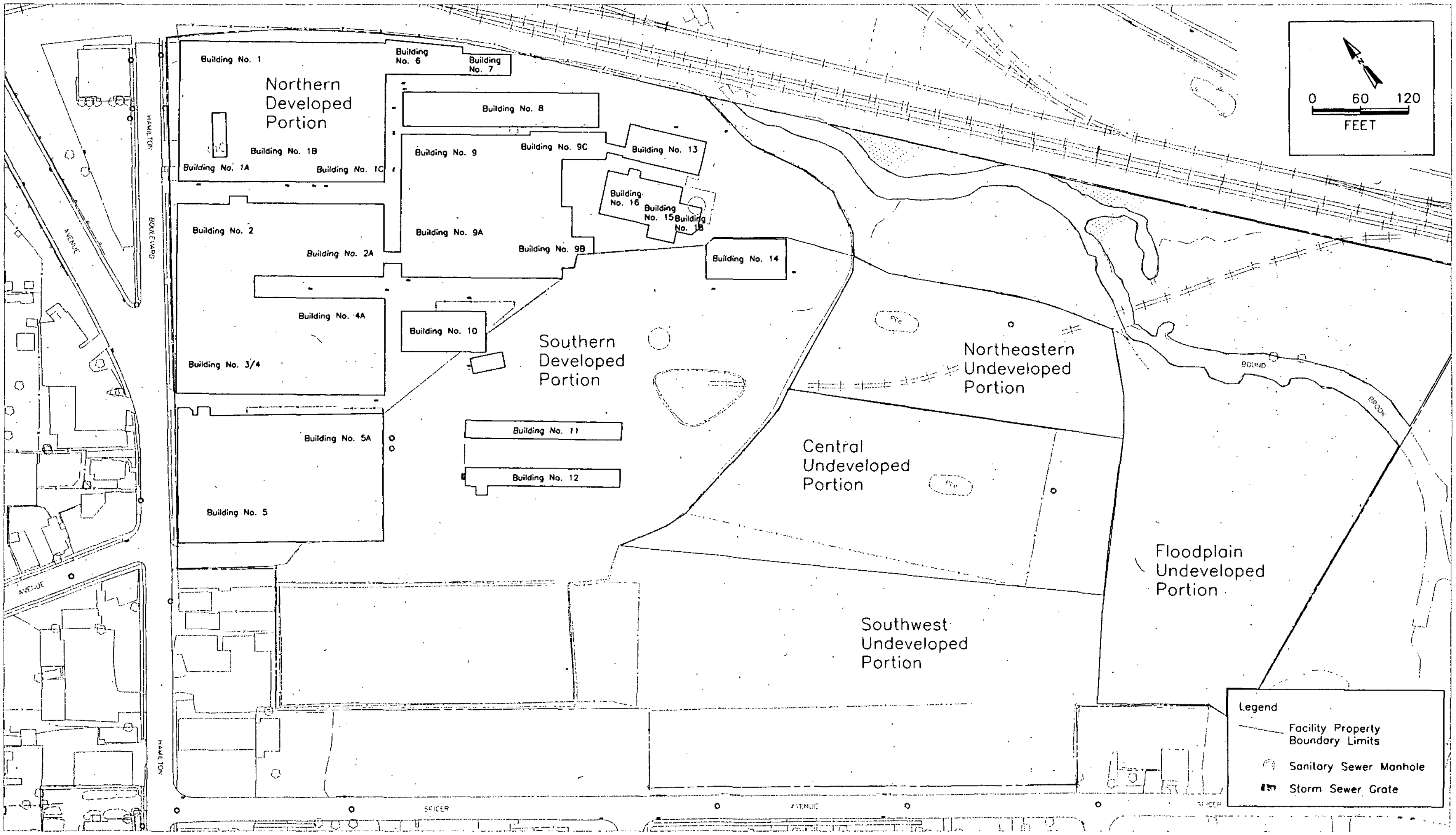
TITLE:
Concentration of Lead in Building Floor Dust
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN: LEN	DES.: LEN	PROJECT NO.: 1945.2118
CHKD: JG	APPD: LH	FIGURE NO.: 1-9
DATE: 03/29/04	REV.: 1	

400163



TETRA TECH FW, INC.	TITLE: Concentration of Mercury in Building Floor Dust Cornell–Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN: LEN	DES.: LEN	PROJECT NO.: 1945.2118
		CHKD: JG	APPD: LH	FIGURE NO.: 1–10
		DATE: 03/29/04	REV.: 1	



400164

TETRA TECH FW, INC.

TITLE:
General Divided Facility Areas
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118
CHKD: JG	REV.: 1	FIGURE NO.: 1-11
DES.: LEN	APPD: LH	

.5	92
51	0.1 B
2	17

NITS	Criteria	CDE-MW09-00 09/18/2000
		0.500
g/kg)	600	740
g/kg)	600	840
g/kg)	60	770
g/kg)	600	620
g/kg)	60	280 J
g/kg)	0.50	2400
g/kg)	100	1900 J
g/kg)	70	3000 NJ
g/kg)	4.0	29000 DNJ
g/kg)	2000	25000 DJ
g/kg)	2000	42000
g/kg)	2000	20000 DJ
g/kg)	371	330000 J
g/kg)	5	10.2 B
g/kg)	0.371	330
g/kg)	0.4	8.3
g/kg)	283	765
g/kg)	4	39.7 J
g/kg)	0.4	37.8
g/kg)	40.5	967
g/kg)	0.00051	0.47
g/kg)	30	56.3
g/kg)	0.21	0.9 B
g/kg)	2	26.8 J
g/kg)	2	49.3
g/kg)	8.5	1550 J
pg/g)	3.2	56.7

SS02

CONSTITUENT	UNITS	Criteria	CDE-SS02-00 09/15/2000
Sample Depth			0.500
Benzo(a)pyrene	(ug/kg)	60	90 J
Aroclor 1254	(ug/kg)	371	600 DJ
Total PCBs	(mg/kg)	0.371	0.6
Arsenic	(mg/kg)	0.4	8.6
Cadmium	(mg/kg)	4	8.1
Chromium	(mg/kg)	0.4	30.9
Lead	(mg/kg)	40.5	66.1
Silver	(mg/kg)	2	3.2
Vanadium	(mg/kg)	2	30.3
Zinc	(mg/kg)	8.5	127

TP03

CONSTITUENT	UNITS	Criteria	CDE-TP03-01 06/08/2000	CDE-TP33-01 06/08/2000 Dup. of TP03-01
Sample Depth			1.500	1.500
Vinyl chloride	(ug/kg)	10	120 J	U
Trichloroethylene	(ug/kg)	60	18 J	63 J
Benzo(a)anthracene	(ug/kg)	600	2100 J	2400 J
Benzo(b)fluoranthene	(ug/kg)	600	UJ	3900 J
Benzo(k)fluoranthene	(ug/kg)	900	UJ	1300 J
Benzo(a)pyrene	(ug/kg)	60	UJ	4200 J
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	UJ	2500 J
Aroclor 1248	(ug/kg)	371	410 J	UJ
Total PCBs	(mg/kg)	0.371	0.41	UJ
Arsenic	(mg/kg)	0.4	4.2 J	3 J
Chromium	(mg/kg)	0.4	27.5	19.6
Mercury	(mg/kg)	0.00051	0.07 B	0.07 B
Selenium	(mg/kg)	0.21	1.3 J	0.67 BJ
Vanadium	(mg/kg)	2	20.5	17.9
Zinc	(mg/kg)	8.5	36.2	32.9

DWN: CTS	DES.: LEN	PROJECT NO.: 1945.2118
CHKD: JG/PB	APPD: LH	FIGURE NO.: 1-12
DATE: 03/29/04	REV.: 3	

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NEW YORK, NY 10007

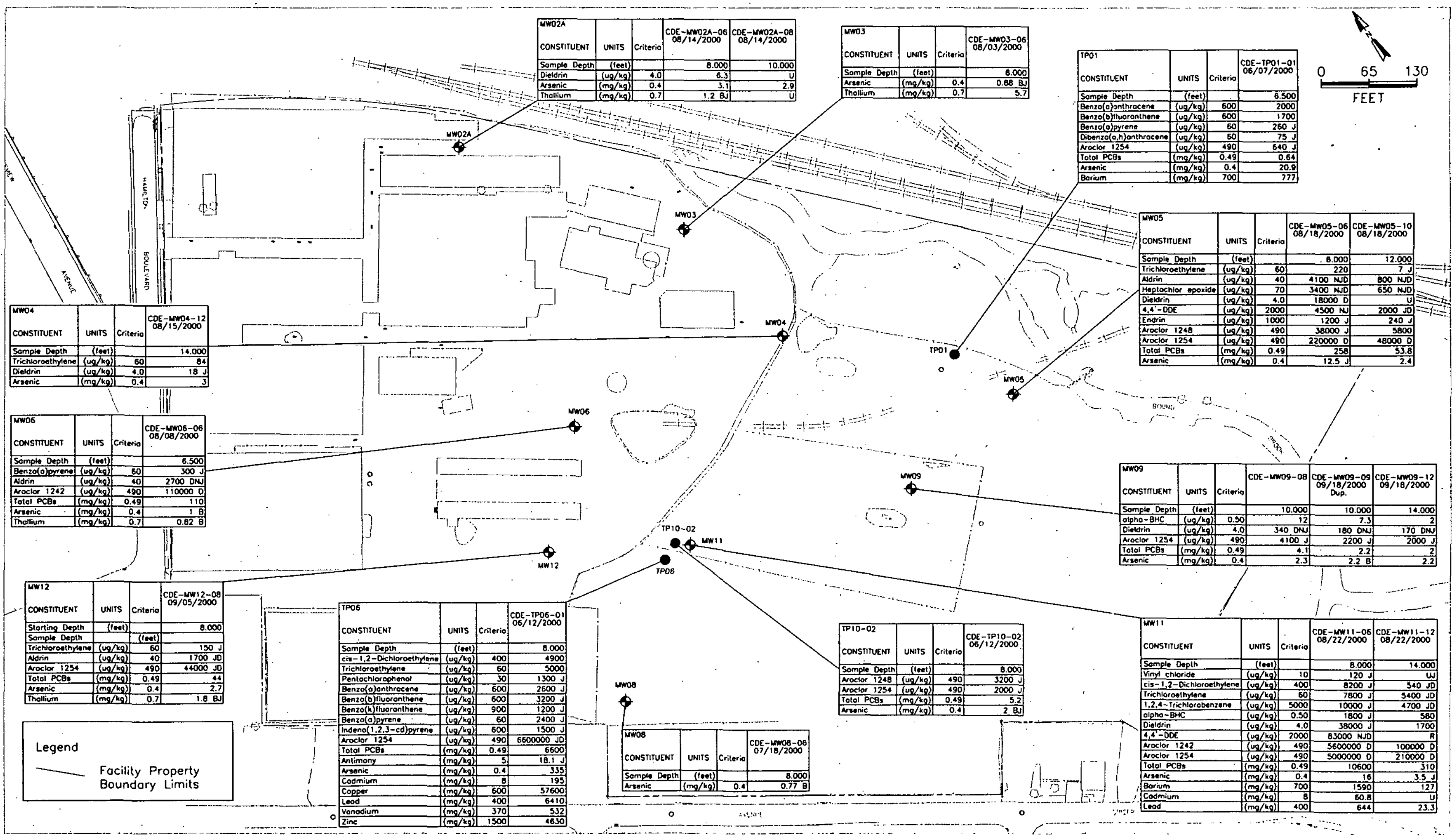
MW04 CONSTITUENT	UNITS	Criteria	CDE-MW04-04 08/15/2000
Sample Depth		(feet)	
Trichloroethylene	(ug/kg)	60	2100 D
Aroclor 1254	(ug/kg)	490	1500 JD
Total PCBs	(mg/kg)	0.49	1.63
Arsenic	(mg/kg)	0.4	21.6 J
Chromium	(mg/kg)	38	53.2 J
Thallium	(mg/kg)	0.7	1.9 B

3-02 STITUENT	UNITS	Criteria	CDE-TP08-02 06/09/2000
ple Depth	(feet)		3.500
loroethylene	(ug/kg)	60	5300 J
lor 1254	(ug/kg)	490	8300000 JD
l PCBs	(mg/kg)	0.49	8300
nic	(mg/kg)	0.4	10 J
mium	(mg/kg)	8	11
	(mg/kg)	400	639

TP02 CONSTITUENT	UNITS	Criteria	CDE-TP02-01 06/08/2000
Sample Depth	(feet)		4.000
Diethyl phthalate	(ug/kg)	50000	52000
Carbazole	(ug/kg)	600	23000
Fluoranthene	(ug/kg)	100000	390000 D
Pyrene	(ug/kg)	100000	120000
Benzo(a)anthracene	(ug/kg)	600	170000 D
Chrysene	(ug/kg)	9000	170000 D
Benzo(b)fluoranthene	(ug/kg)	600	180000 D
Benzo(k)fluoranthene	(ug/kg)	900	73000
Benzo(a)pyrene	(ug/kg)	60	42000
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	38000
Dibenzo(a,h)anthracene	(ug/kg)	60	23000
Aroclor 1254	(ug/kg)	490	49000 JD
Total PCBs	(mg/kg)	0.49	49
Antimony	(mg/kg)	5	13.9 BJ
Arsenic	(mg/kg)	0.4	34.8
Cadmium	(mg/kg)	8	23.8
Chromium	(mg/kg)	38	107
Lead	(mg/kg)	400	472
Selenium	(mg/kg)	5	7.9
Zinc	(mg/kg)	1500	2880

TUENT	UNITS	Criteria	CDE-MW09-04 09/18/2000
Depth	(feet)		6.000
lor epoxide	(ug/kg)	70	1200000 NJ
	(ug/kg)	4.0	11000000 DNJ
DE	(ug/kg)	2000	9700000 DJ
DT	(ug/kg)	2000	25000000 D
-Chlordane	(ug/kg)	2000	8200000 DJ
1254	(ug/kg)	490	130000000 J
CBs	(mg/kg)	0.49	130000
	(mg/kg)	0.4	2.4 B
	(mg/kg)	700	2960
um	(mg/kg)	38	248
	(mg/kg)	2	3.4
	(mg/kg)	1500	1970 J

DWN: CTS	DES.: LEN	PROJECT NO.: 1945.2118
CHKD: JG/PB	APPD: LH	FIGURE NO.: 1-13
DATE: 03/29/04	REV.: 3	



MW02A CONSTITUENT	UNITS	Criteria	CDE-MW02A-06 08/14/2000	CDE-MW02A-08 08/14/2000
Sample Depth	(feet)		8.000	10.000
Dieldrin	(ug/kg)	4.0	6.3	U
Arsenic	(mg/kg)	0.4	3.1	2.9
Thallium	(mg/kg)	0.7	1.2 BJ	U

MW03 CONSTITUENT	UNITS	Criteria	CDE-MW03-06 08/03/2000
Sample Depth	(feet)		8.000
Arsenic	(mg/kg)	0.4	0.88 BJ
Thallium	(mg/kg)	0.7	5.7

TP01 CONSTITUENT	UNITS	Criteria	CDE-TP01-01 06/07/2000
Sample Depth	(feet)		6.500
Benzo(a)anthracene	(ug/kg)	600	2000
Benzo(b)fluoranthene	(ug/kg)	600	1700
Benzo(a)pyrene	(ug/kg)	60	260 J
Dibenzo(a,h)anthracene	(ug/kg)	60	75 J
Aroclor 1254	(ug/kg)	490	640 J
Total PCBs	(mg/kg)	0.49	0.64
Arsenic	(mg/kg)	0.4	20.9
Barium	(mg/kg)	700	777

MW05 CONSTITUENT	UNITS	Criteria	CDE-MW05-06 08/18/2000	CDE-MW05-10 08/18/2000
Sample Depth	(feet)		8.000	12.000
Trichloroethylene	(ug/kg)	60	220	7 J
Aldrin	(ug/kg)	40	4100 NJD	800 NJD
Heptachlor epoxide	(ug/kg)	70	3400 NJD	650 NJD
Dieldrin	(ug/kg)	4.0	18000 D	U
4,4'-DDE	(ug/kg)	2000	4500 NJ	2000 JD
Endrin	(ug/kg)	1000	1200 J	240 J
Aroclor 1248	(ug/kg)	490	38000 J	5800
Aroclor 1254	(ug/kg)	490	220000 D	48000 D
Total PCBs	(mg/kg)	0.49	258	53.8
Arsenic	(mg/kg)	0.4	12.5 J	2.4

MW04 CONSTITUENT	UNITS	Criteria	CDE-MW04-12 08/15/2000
Sample Depth	(feet)		14.000
Trichloroethylene	(ug/kg)	60	84
Dieldrin	(ug/kg)	4.0	18 J
Arsenic	(mg/kg)	0.4	3

MW06 CONSTITUENT	UNITS	Criteria	CDE-MW06-06 08/08/2000
Sample Depth	(feet)		6.500
Benzo(a)pyrene	(ug/kg)	60	300 J
Aldrin	(ug/kg)	40	2700 DNJ
Aroclor 1242	(ug/kg)	490	110000 D
Total PCBs	(mg/kg)	0.49	110
Arsenic	(mg/kg)	0.4	1 B
Thallium	(mg/kg)	0.7	0.82 B

MW09 CONSTITUENT	UNITS	Criteria	CDE-MW09-08	CDE-MW09-09 09/18/2000 Dup.	CDE-MW09-12 09/18/2000
Sample Depth	(feet)		10.000	10.000	14.000
alpha-BHC	(ug/kg)	0.50	12	7.3	2
Dieldrin	(ug/kg)	4.0	340 DNJ	180 DNJ	170 DNJ
Aroclor 1254	(ug/kg)	490	4100 J	2200 J	2000 J
Total PCBs	(mg/kg)	0.49	4.1	2.2	2
Arsenic	(mg/kg)	0.4	2.3	2.2 B	2.2

MW12 CONSTITUENT	UNITS	Criteria	CDE-MW12-08 09/05/2000
Starting Depth	(feet)		8.000
Sample Depth		(feet)	
Trichloroethylene	(ug/kg)	60	150 J
Aldrin	(ug/kg)	40	1700 JD
Aroclor 1254	(ug/kg)	490	44000 JD
Total PCBs	(mg/kg)	0.49	44
Arsenic	(mg/kg)	0.4	2.7
Thallium	(mg/kg)	0.7	1.8 BJ

TP06 CONSTITUENT	UNITS	Criteria	CDE-TP06-01 06/12/2000
Sample Depth	(feet)		8.000
cis-1,2-Dichloroethylene	(ug/kg)	400	4900
Trichloroethylene	(ug/kg)	60	5000
Pentachlorophenol	(ug/kg)	30	1300 J
Benzo(a)anthracene	(ug/kg)	600	2600 J
Benzo(b)fluoranthene	(ug/kg)	600	3200 J
Benzo(k)fluoranthene	(ug/kg)	900	1200 J
Benzo(a)pyrene	(ug/kg)	60	2400 J
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	1500 J
Aroclor 1254	(ug/kg)	490	6600000 JD
Total PCBs	(mg/kg)	0.49	6600
Antimony	(mg/kg)	5	18.1 J
Arsenic	(mg/kg)	0.4	335
Cadmium	(mg/kg)	8	195
Copper	(mg/kg)	600	57600
Lead	(mg/kg)	400	6410
Vanadium	(mg/kg)	370	532
Zinc	(mg/kg)	1500	4630

TP10-02 CONSTITUENT	UNITS	Criteria	CDE-TP10-02 06/12/2000
Sample Depth	(feet)		8.000
Aroclor 1248	(ug/kg)	490	3200 J
Aroclor 1254	(ug/kg)	490	2000 J
Total PCBs	(mg/kg)	0.49	5.2
Arsenic	(mg/kg)	0.4	2 BJ

MW08 CONSTITUENT	UNITS	Criteria	CDE-MW08-06 07/18/2000
Sample Depth	(feet)		8.000
Arsenic	(mg/kg)	0.4	0.77 B

MW11 CONSTITUENT	UNITS	Criteria	CDE-MW11-06 08/22/2000	CDE-MW11-12 08/22/2000
Sample Depth	(feet)		8.000	14.000
Vinyl chloride	(ug/kg)	10	120 J	UJ
cis-1,2-Dichloroethylene	(ug/kg)	400	8200 J	540 JD
Trichloroethylene	(ug/kg)	60	7800 J	5400 JD
1,2,4-Trichlorobenzene	(ug/kg)	5000	10000 J	4700 JD
alpha-BHC	(ug/kg)	0.50	1800 J	580
Dieldrin	(ug/kg)	4.0	38000 J	1700
4,4'-DDE	(ug/kg)	2000	83000 NJD	R
Aroclor 1242	(ug/kg)	490	5600000 D	100000 D
Aroclor 1254	(ug/kg)	490	5000000 D	210000 D
Total PCBs	(mg/kg)	0.49	10600	310
Arsenic	(mg/kg)	0.4	16	3.5 J
Barium	(mg/kg)	700	1590	127
Cadmium	(mg/kg)	8	60.8	U
Lead	(mg/kg)	400	644	23.3

TETRA TECH FW, INC.

TITLE:
Constituents Exceeding Screening Criteria in Subsurface (6 to 14 feet bgs) Soil
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118
CHKD: JG	REV.: 3	FIGURE NO.: 1-14
DES.: LEN	APPD: LH	

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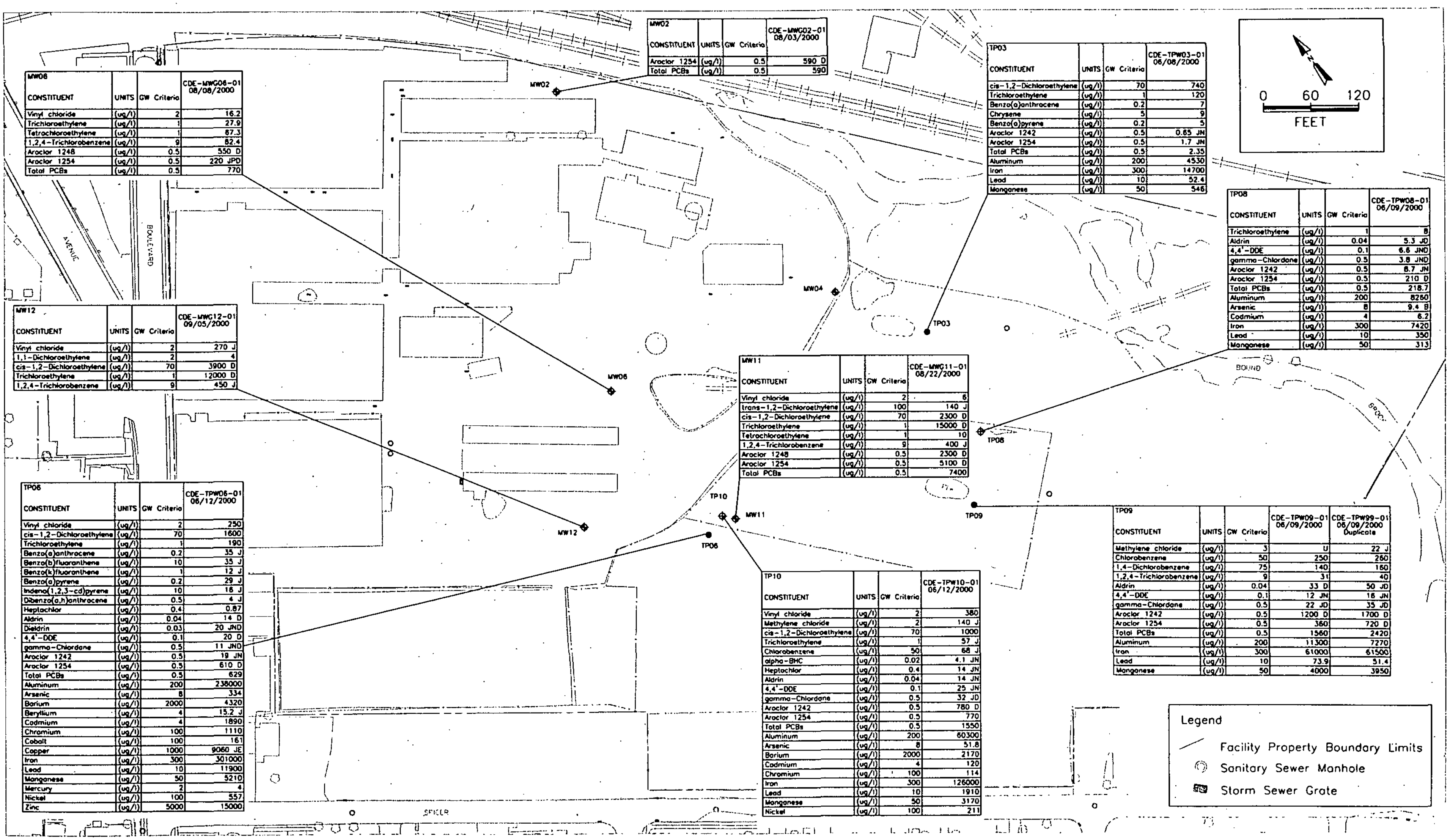

MW02 CONSTITUENT	UNITS	GW Criteria	CDE-MWG02-01 08/03/2000
Aroclor 1254	(ug/l)	0.5	590 D
Total PCBs	(ug/l)	0.5	590

MW06 CONSTITUENT	UNITS	GW Criteria	CDE-MWG06-01 08/08/2000
Vinyl chloride	(ug/l)	2	16.2
Trichloroethylene	(ug/l)	1	27.9
Tetrachloroethylene	(ug/l)	1	87.3
1,2,4-Trichlorobenzene	(ug/l)	9	82.4
Aroclor 1248	(ug/l)	0.5	550 D
Aroclor 1254	(ug/l)	0.5	220 JPD
Total PCBs	(ug/l)	0.5	770

TP03 CONSTITUENT	UNITS	GW Criteria	CDE-TPW03-01 06/08/2000
cis-1,2-Dichloroethylene	(ug/l)	70	740
Trichloroethylene	(ug/l)	1	120
Benzo(a)anthracene	(ug/l)	0.2	7
Chrysene	(ug/l)	5	9
Benzo(a)pyrene	(ug/l)	0.2	5
Aroclor 1242	(ug/l)	0.5	0.65 JN
Aroclor 1254	(ug/l)	0.5	1.7 JN
Total PCBs	(ug/l)	0.5	2.35
Aluminum	(ug/l)	200	4530
Iron	(ug/l)	300	14700
Lead	(ug/l)	10	52.4
Manganese	(ug/l)	50	546

TP08 CONSTITUENT	UNITS	GW Criteria	CDE-TPW08-01 06/09/2000
Trichloroethylene	(ug/l)	1	8
Aldrin	(ug/l)	0.04	5.3 JD
4,4'-DDE	(ug/l)	0.1	6.6 JND
gamma-Chlordane	(ug/l)	0.5	3.8 JND
Aroclor 1242	(ug/l)	0.5	8.7 JN
Aroclor 1254	(ug/l)	0.5	210 D
Total PCBs	(ug/l)	0.5	218.7
Aluminum	(ug/l)	200	8260
Arsenic	(ug/l)	8	9.4 B
Cadmium	(ug/l)	4	6.2
Iron	(ug/l)	300	7420
Lead	(ug/l)	10	350
Manganese	(ug/l)	50	313

MW12 CONSTITUENT	UNITS	GW Criteria	CDE-MWG12-01 09/05/2000
Vinyl chloride	(ug/l)	2	270 J
1,1-Dichloroethylene	(ug/l)	2	4
cis-1,2-Dichloroethylene	(ug/l)	70	3900 D
Trichloroethylene	(ug/l)	1	12000 D
1,2,4-Trichlorobenzene	(ug/l)	9	450 J

MW11 CONSTITUENT	UNITS	GW Criteria	CDE-MWG11-01 08/22/2000
Vinyl chloride	(ug/l)	2	6
trans-1,2-Dichloroethylene	(ug/l)	100	140 J
cis-1,2-Dichloroethylene	(ug/l)	70	2300 D
Trichloroethylene	(ug/l)	1	15000 D
Tetrachloroethylene	(ug/l)	1	10
1,2,4-Trichlorobenzene	(ug/l)	9	400 J
Aroclor 1248	(ug/l)	0.5	2300 D
Aroclor 1254	(ug/l)	0.5	5100 D
Total PCBs	(ug/l)	0.5	7400

TP06 CONSTITUENT	UNITS	GW Criteria	CDE-TPW06-01 06/12/2000
Vinyl chloride	(ug/l)	2	250
cis-1,2-Dichloroethylene	(ug/l)	70	1600
Trichloroethylene	(ug/l)	1	190
Benzo(a)anthracene	(ug/l)	0.2	35 J
Benzo(b)fluoranthene	(ug/l)	10	35 J
Benzo(k)fluoranthene	(ug/l)	1	12 J
Benzo(a)pyrene	(ug/l)	0.2	29 J
Indeno(1,2,3-cd)pyrene	(ug/l)	10	18 J
Dibenzo(a,h)anthracene	(ug/l)	0.5	4 J
Heptachlor	(ug/l)	0.4	0.87
Aldrin	(ug/l)	0.04	14 D
Dieldrin	(ug/l)	0.03	20 JND
4,4'-DDE	(ug/l)	0.1	20 D
gamma-Chlordane	(ug/l)	0.5	11 JND
Aroclor 1242	(ug/l)	0.5	19 JN
Aroclor 1254	(ug/l)	0.5	610 D
Total PCBs	(ug/l)	0.5	629
Aluminum	(ug/l)	200	238000
Arsenic	(ug/l)	8	334
Barium	(ug/l)	2000	4320
Beryllium	(ug/l)	4	15.2 J
Cadmium	(ug/l)	4	1890
Chromium	(ug/l)	100	1110
Cobalt	(ug/l)	100	161
Copper	(ug/l)	1000	9060 JE
Iron	(ug/l)	300	301000
Lead	(ug/l)	10	11900
Manganese	(ug/l)	50	5210
Mercury	(ug/l)	2	4
Nickel	(ug/l)	100	557
Zinc	(ug/l)	5000	15000

TP10 CONSTITUENT	UNITS	GW Criteria	CDE-TPW10-01 06/12/2000
Vinyl chloride	(ug/l)	2	380
Methylene chloride	(ug/l)	2	140 J
cis-1,2-Dichloroethylene	(ug/l)	70	1000
Trichloroethylene	(ug/l)	1	57 J
Chlorobenzene	(ug/l)	50	68 J
alpha-BHC	(ug/l)	0.02	4.1 JN
Heptachlor	(ug/l)	0.4	14 JN
Aldrin	(ug/l)	0.04	14 JN
4,4'-DDE	(ug/l)	0.1	25 JN
gamma-Chlordane	(ug/l)	0.5	32 JD
Aroclor 1242	(ug/l)	0.5	780 D
Aroclor 1254	(ug/l)	0.5	770
Total PCBs	(ug/l)	0.5	1550
Aluminum	(ug/l)	200	60300
Arsenic	(ug/l)	8	51.8
Barium	(ug/l)	2000	2170
Cadmium	(ug/l)	4	120
Chromium	(ug/l)	100	114
Iron	(ug/l)	300	126000
Lead	(ug/l)	10	1910
Manganese	(ug/l)	50	3170
Nickel	(ug/l)	100	211

TP09 CONSTITUENT	UNITS	GW Criteria	CDE-TPW09-01 06/09/2000	CDE-TPW99-01 06/09/2000 Duplicate
Methylene chloride	(ug/l)	3	U	22 J
Chlorobenzene	(ug/l)	50	250	260
1,4-Dichlorobenzene	(ug/l)	75	140	160
1,2,4-Trichlorobenzene	(ug/l)	9	31	40
Aldrin	(ug/l)	0.04	33 D	50 JD
4,4'-DDE	(ug/l)	0.1	12 JN	16 JN
gamma-Chlordane	(ug/l)	0.5	22 JD	35 JD
Aroclor 1242	(ug/l)	0.5	1200 D	1700 D
Aroclor 1254	(ug/l)	0.5	360	720 D
Total PCBs	(ug/l)	0.5	1560	2420
Aluminum	(ug/l)	200	11300	7270
Iron	(ug/l)	300	61000	61500
Lead	(ug/l)	10	73.9	51.4
Manganese	(ug/l)	50	4000	3950

TETRA TECH FW, INC.

TITLE: Constituents Exceeding Screening Criteria in Perched Water
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118
CHKD: JG	REV.: 2	FIGURE NO.: 1-15
DES.: LEN	APPD: LH	

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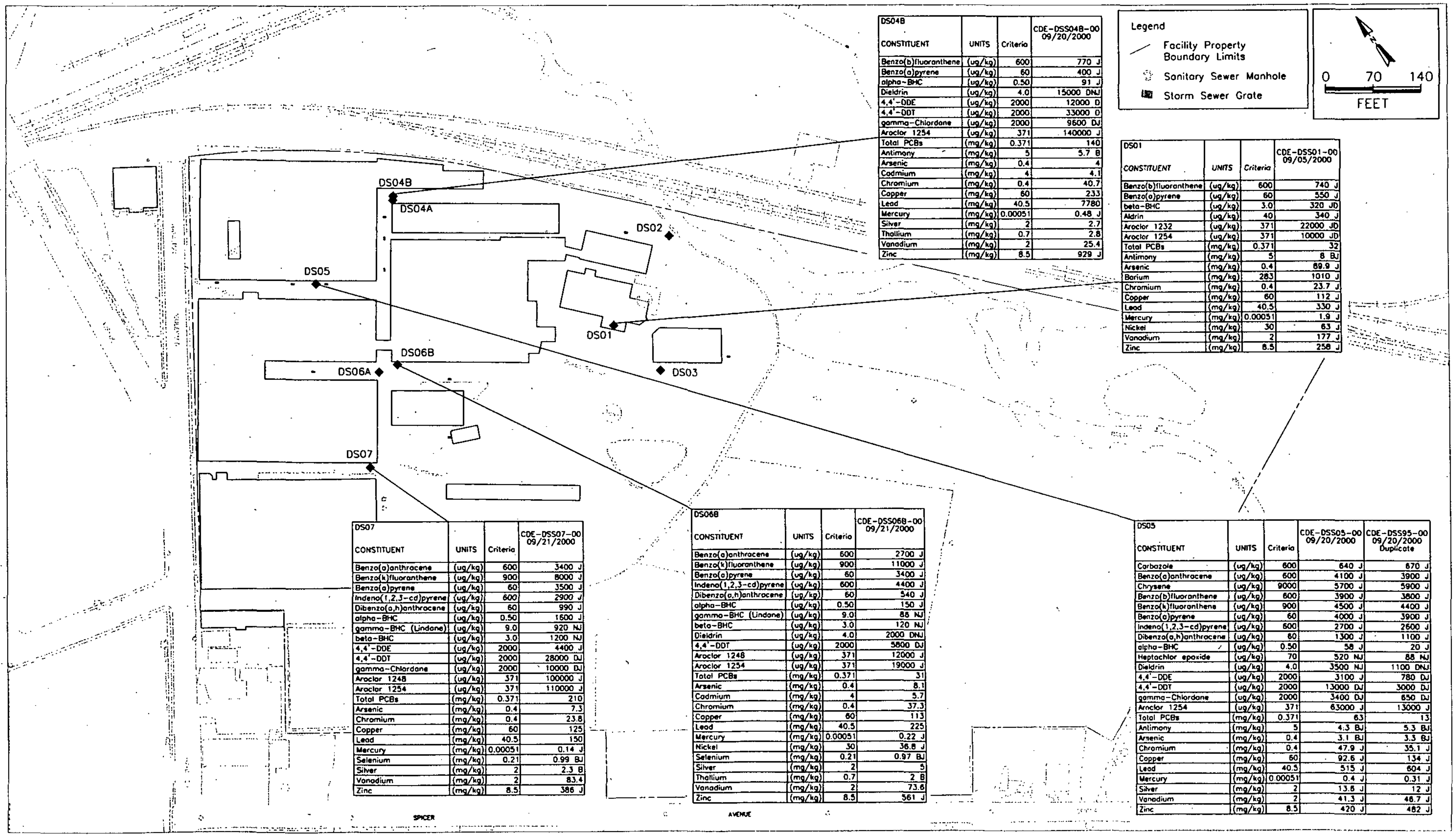

DS04B CONSTITUENT	UNITS	Criteria	CDE-DSS04B-00 09/20/2000
Benzo(b)fluoranthene	(ug/kg)	600	770 J
Benzo(a)pyrene	(ug/kg)	60	400 J
alpha-BHC	(ug/kg)	0.50	91 J
Dieldrin	(ug/kg)	4.0	15000 DNJ
4,4'-DDE	(ug/kg)	2000	12000 D
4,4'-DDT	(ug/kg)	2000	33000 D
gamma-Chlordane	(ug/kg)	2000	9600 DJ
Aroclor 1254	(ug/kg)	371	140000 J
Total PCBs	(mg/kg)	0.371	140
Antimony	(mg/kg)	5	5.7 B
Arsenic	(mg/kg)	0.4	4
Cadmium	(mg/kg)	4	4.1
Chromium	(mg/kg)	0.4	40.7
Copper	(mg/kg)	60	233
Lead	(mg/kg)	40.5	7780
Mercury	(mg/kg)	0.00051	0.48 J
Silver	(mg/kg)	2	2.7
Thallium	(mg/kg)	0.7	2.8
Vanadium	(mg/kg)	2	25.4
Zinc	(mg/kg)	8.5	929 J

DS01 CONSTITUENT	UNITS	Criteria	CDE-DSS01-00 09/05/2000
Benzo(b)fluoranthene	(ug/kg)	600	740 J
Benzo(a)pyrene	(ug/kg)	60	550 J
beta-BHC	(ug/kg)	3.0	320 JD
Aldrin	(ug/kg)	40	340 J
Aroclor 1232	(ug/kg)	371	22000 JD
Aroclor 1254	(ug/kg)	371	10000 JD
Total PCBs	(mg/kg)	0.371	32
Antimony	(mg/kg)	5	8 BJ
Arsenic	(mg/kg)	0.4	89.9 J
Barium	(mg/kg)	283	1010 J
Chromium	(mg/kg)	0.4	23.7 J
Copper	(mg/kg)	60	112 J
Lead	(mg/kg)	40.5	330 J
Mercury	(mg/kg)	0.00051	1.9 J
Nickel	(mg/kg)	30	63 J
Vanadium	(mg/kg)	2	177 J
Zinc	(mg/kg)	8.5	258 J

DS07 CONSTITUENT	UNITS	Criteria	CDE-DSS07-00 09/21/2000
Benzo(a)anthracene	(ug/kg)	600	3400 J
Benzo(k)fluoranthene	(ug/kg)	900	8000 J
Benzo(a)pyrene	(ug/kg)	60	3500 J
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	2900 J
Dibenzo(a,h)anthracene	(ug/kg)	60	990 J
alpha-BHC	(ug/kg)	0.50	1600 J
gamma-BHC (Lindane)	(ug/kg)	9.0	920 NJ
beta-BHC	(ug/kg)	3.0	1200 NJ
4,4'-DDE	(ug/kg)	2000	4400 J
4,4'-DDT	(ug/kg)	2000	28000 DJ
gamma-Chlordane	(ug/kg)	2000	10000 DJ
Aroclor 1248	(ug/kg)	371	100000 J
Aroclor 1254	(ug/kg)	371	110000 J
Total PCBs	(mg/kg)	0.371	210
Arsenic	(mg/kg)	0.4	7.3
Chromium	(mg/kg)	0.4	23.8
Copper	(mg/kg)	60	125
Lead	(mg/kg)	40.5	150
Mercury	(mg/kg)	0.00051	0.14 J
Selenium	(mg/kg)	0.21	0.99 BJ
Silver	(mg/kg)	2	2.3 B
Vanadium	(mg/kg)	2	83.4
Zinc	(mg/kg)	8.5	386 J

DS06B CONSTITUENT	UNITS	Criteria	CDE-DSS06B-00 09/21/2000
Benzo(a)anthracene	(ug/kg)	600	2700 J
Benzo(k)fluoranthene	(ug/kg)	900	11000 J
Benzo(a)pyrene	(ug/kg)	60	3400 J
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	4400 J
Dibenzo(a,h)anthracene	(ug/kg)	60	540 J
alpha-BHC	(ug/kg)	0.50	150 J
gamma-BHC (Lindane)	(ug/kg)	9.0	88 NJ
beta-BHC	(ug/kg)	3.0	120 NJ
Dieldrin	(ug/kg)	4.0	2000 DNJ
4,4'-DDT	(ug/kg)	2000	5800 DJ
Aroclor 1248	(ug/kg)	371	12000 J
Aroclor 1254	(ug/kg)	371	19000 J
Total PCBs	(mg/kg)	0.371	31
Arsenic	(mg/kg)	0.4	8.1
Cadmium	(mg/kg)	4	5.7
Chromium	(mg/kg)	0.4	37.3
Copper	(mg/kg)	60	113
Lead	(mg/kg)	40.5	225
Mercury	(mg/kg)	0.00051	0.22 J
Nickel	(mg/kg)	30	36.8 J
Selenium	(mg/kg)	0.21	0.97 BJ
Silver	(mg/kg)	2	5
Thallium	(mg/kg)	0.7	2 B
Vanadium	(mg/kg)	2	73.6
Zinc	(mg/kg)	8.5	561 J

DS05 CONSTITUENT	UNITS	Criteria	CDE-DSS05-00 09/20/2000	CDE-DSS95-00 09/20/2000 Duplicate
Carbazole	(ug/kg)	600	640 J	670 J
Benzo(a)anthracene	(ug/kg)	600	4100 J	3900 J
Chrysene	(ug/kg)	9000	5700 J	5900 J
Benzo(b)fluoranthene	(ug/kg)	600	3900 J	3800 J
Benzo(k)fluoranthene	(ug/kg)	900	4500 J	4400 J
Benzo(a)pyrene	(ug/kg)	60	4000 J	3900 J
Indeno(1,2,3-cd)pyrene	(ug/kg)	600	2700 J	2600 J
Dibenzo(a,h)anthracene	(ug/kg)	60	1300 J	1100 J
alpha-BHC	(ug/kg)	0.50	58 J	20 J
Heptachlor epoxide	(ug/kg)	70	520 NJ	88 NJ
Dieldrin	(ug/kg)	4.0	3500 NJ	1100 DNJ
4,4'-DDE	(ug/kg)	2000	3100 J	780 DJ
4,4'-DDT	(ug/kg)	2000	13000 DJ	3000 DJ
gamma-Chlordane	(ug/kg)	2000	3400 DJ	650 DJ
Aroclor 1254	(ug/kg)	371	63000 J	13000 J
Total PCBs	(mg/kg)	0.371	63	13
Antimony	(mg/kg)	5	4.3 BJ	5.3 BJ
Arsenic	(mg/kg)	0.4	3.1 BJ	3.3 BJ
Chromium	(mg/kg)	0.4	47.9 J	35.1 J
Copper	(mg/kg)	60	92.6 J	134 J
Lead	(mg/kg)	40.5	515 J	604 J
Mercury	(mg/kg)	0.00051	0.4 J	0.31 J
Silver	(mg/kg)	2	13.6 J	12 J
Vanadium	(mg/kg)	2	41.3 J	48.7 J
Zinc	(mg/kg)	8.5	420 J	482 J

TETRA TECH FW, INC.

TITLE:
Constituents Exceeding Screening Criteria in Drainage System Sediments
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118	
CHKD: JG	REV.: 2	FIGURE NO.: 1-16	
DES.: LEN	APPD: LH		

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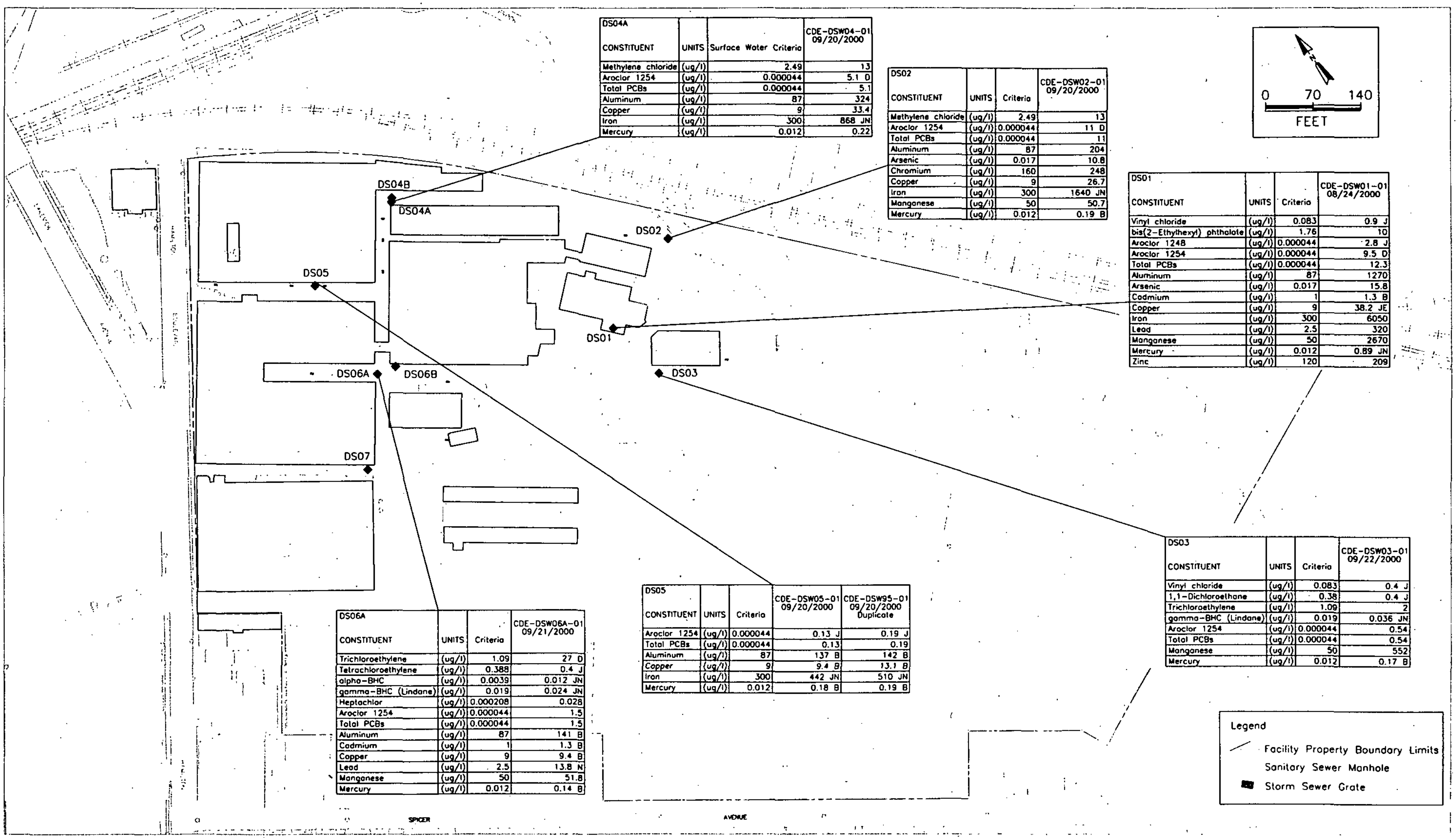


DS04A CONSTITUENT	UNITS	Surface Water Criteria	CDE-DSW04-01 09/20/2000
Methylene chloride	(ug/l)	2.49	13
Aroclor 1254	(ug/l)	0.000044	5.1 D
Total PCBs	(ug/l)	0.000044	5.1
Aluminum	(ug/l)	87	324
Copper	(ug/l)	9	33.4
Iron	(ug/l)	300	868 JN
Mercury	(ug/l)	0.012	0.22

DS02 CONSTITUENT	UNITS	Criteria	CDE-DSW02-01 09/20/2000
Methylene chloride	(ug/l)	2.49	13
Aroclor 1254	(ug/l)	0.000044	11 D
Total PCBs	(ug/l)	0.000044	11
Aluminum	(ug/l)	87	204
Arsenic	(ug/l)	0.017	10.8
Chromium	(ug/l)	160	248
Copper	(ug/l)	9	26.7
Iron	(ug/l)	300	1640 JN
Manganese	(ug/l)	50	50.7
Mercury	(ug/l)	0.012	0.19 B

DS01 CONSTITUENT	UNITS	Criteria	CDE-DSW01-01 08/24/2000
Vinyl chloride	(ug/l)	0.083	0.9 J
bis(2-Ethylhexyl) phthalate	(ug/l)	1.76	10
Aroclor 1248	(ug/l)	0.000044	2.8 J
Aroclor 1254	(ug/l)	0.000044	9.5 D
Total PCBs	(ug/l)	0.000044	12.3
Aluminum	(ug/l)	87	1270
Arsenic	(ug/l)	0.017	15.8
Cadmium	(ug/l)	1	1.3 B
Copper	(ug/l)	9	38.2 JE
Iron	(ug/l)	300	6050
Lead	(ug/l)	2.5	320
Manganese	(ug/l)	50	2670
Mercury	(ug/l)	0.012	0.89 JN
Zinc	(ug/l)	120	209

DS03 CONSTITUENT	UNITS	Criteria	CDE-DSW03-01 09/22/2000
Vinyl chloride	(ug/l)	0.083	0.4 J
1,1-Dichloroethane	(ug/l)	0.38	0.4 J
Trichloroethylene	(ug/l)	1.09	2
gamma-BHC (Lindane)	(ug/l)	0.019	0.036 JN
Aroclor 1254	(ug/l)	0.000044	0.54
Total PCBs	(ug/l)	0.000044	0.54
Manganese	(ug/l)	50	552
Mercury	(ug/l)	0.012	0.17 B

DS05 CONSTITUENT	UNITS	Criteria	CDE-DSW05-01 09/20/2000	CDE-DSW95-01 09/20/2000 Duplicate
Aroclor 1254	(ug/l)	0.000044	0.13 J	0.19 J
Total PCBs	(ug/l)	0.000044	0.13	0.19
Aluminum	(ug/l)	87	137 B	142 B
Copper	(ug/l)	9	9.4 B	13.1 B
Iron	(ug/l)	300	442 JN	510 JN
Mercury	(ug/l)	0.012	0.18 B	0.19 B

DS06A CONSTITUENT	UNITS	Criteria	CDE-DSW06A-01 09/21/2000
Trichloroethylene	(ug/l)	1.09	27 D
Tetrachloroethylene	(ug/l)	0.388	0.4 J
alpha-BHC	(ug/l)	0.0039	0.012 JN
gamma-BHC (Lindane)	(ug/l)	0.019	0.024 JN
Heptachlor	(ug/l)	0.000208	0.028
Aroclor 1254	(ug/l)	0.000044	1.5
Total PCBs	(ug/l)	0.000044	1.5
Aluminum	(ug/l)	87	141 B
Cadmium	(ug/l)	1	1.3 B
Copper	(ug/l)	9	9.4 B
Lead	(ug/l)	2.5	13.8 N
Manganese	(ug/l)	50	51.8
Mercury	(ug/l)	0.012	0.14 B

400170

TETRA TECH FW, INC.

TITLE:
Constituents Exceeding Screening Criteria in Drainage System Water
Cornell-Dubilier Electronics Superfund Site
Facility Soils and Buildings FS Report

DWN.: CTS	DATE: 03/29/04	PROJECT NO.: 1945.2118
CHKD: JG	REV.: 1	FIGURE NO.: 1-17
DES.: LEN	APPD: LH	

SECTION 2.0

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

2.1 Introduction

The purpose of this section is to present the development of remedial action objectives (RAOs) and the identification, screening and selection of the most appropriate technologies to address contaminated facility soils and buildings.

The screening of technologies consisted of the following steps:

- Development of RAOs specifying the contaminants and media of interest, exposure pathways, and compliance with ARARs that permit a range of treatment and containment alternatives to be developed.

- Identification of GRAs, including engineering and institutional controls, removal, treatment, or other actions, singly or in combination, that may be taken to satisfy the RAOs for the site.

- Identification and screening of the technologies applicable to each GRA to eliminate those that cannot be implemented technically. The GRAs are further defined to specify remedial technology types (*e.g.*, the GRA of treatment can be further defined to include physical, chemical, or biological technology types).

- Identification and evaluation of process options to select a representative process for each technology type retained for consideration. Although specific processes are selected for alternative development and evaluation, these processes are intended to represent the broader range of process options within a general technology type. Utilizing process options provides greater flexibility in the final design while simplifying the FS process. During final design, any of the process options within a technology type can be substituted for another, thereby providing a broader range of viable alternatives.

2.2 Remedial Action Objectives

RAOs are identified to protect human health and the environment based on consideration of the chemicals of potential concern, exposure routes, receptors, and acceptable contaminant levels for each exposure pathway, including risk-based levels and ARARs/TBCs.

2.2.1 <u>Chemicals of Potential Concern</u>

As discussed in the Remedial Investigation Report for OU-2 (TtFW, 2002), PCBs, VOCs, SVOCs, dioxins, pesticides, and metals were detected at the facility. Based on validity of the analytical results, frequency of occurrence, concentrations relative to natural (background) levels, and/or toxicological, physical, and chemical characteristics, COPCs were selected in the RI for evaluation in the risk assessment.

A comparison of the concentrations of contaminants observed in soils or building dust to ARAR-based cleanup levels is presented in Tables 4-8 to 4-10 of the Remedial Investigation Report for OU-2. Criteria considered in the evaluation included:

- EPA Generic Soil Screening Levels (SSLs);
- EPA Generic Migration to Groundwater Levels with a Dilution Attenuation Factor (DAF) of 20;
- NJDEP Soil Cleanup Criteria for Residential Direct Contact, Non-Residential Direct Contact, and Impact to Groundwater;
- DOE Preliminary Remediation Goals for Ecological Endpoints; and
- Toxic Substances Control Act (TSCA).

A summary of these criteria is presented in Tables 1-1 through 1-4, and analytical data exceeding the most stringent of these criteria are presented on Figures 1-12 through 1-17. Based on these tables and figures, a number of sampling locations for PCBs, VOCs, SVOCs, pesticides, dioxins, cyanide and metals exceed the most conservative cleanup levels. These compounds are identified as COPC's and are listed in Table 2-1.

2.2.2 Exposure Pathways Based on Risk Assessment

The Remedial Investigation Report for OU-2 identifies current and future populations potentially exposed to site contaminants via soils or building dust, and the potential exposure pathways. To evaluate potential human health risks, the following exposure pathways were identified:

- Ingestion, inhalation, and dermal contact with soils or building dust by trespassers in the current and future use scenarios;
- Ingestion, inhalation, and dermal contact with soils or building dust by commercial (indoor and/or outdoor) site workers in the current and future use scenarios; and
- Ingestion, inhalation and dermal contact with soils or building dust by construction workers in the future use scenario.

2.2.3 ARARs and TBCs

EPA developed the ARAR concept to govern compliance with environmental and public health statutes. ARARs are used in the FS process to characterize the performance level that a remedial alternative or a treatment process is capable of achieving. Each remedial alternative and treatment process option must be assessed to evaluate whether it attains or exceeds federal and state ARARs.

ARARs include "applicable" and "relevant and appropriate" requirements of federal and state environmental laws. Applicable requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law, that while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. When establishing performance goals for remedial alternative selection, relevant and appropriate requirements are given equal weight and consideration as applicable requirements. State requirements are ARARs when promulgated, identified in a timely manner, and at least as strict as existing equivalent federal ARARs. Section 121 of CERCLA requires that EPA select remedial actions that will comply with ARARs, unless the criteria for a waiver are met, as discussed below, and EPA waives one or more ARARs.

If no ARARs address a particular situation, other federal and state criteria, advisories, guidance, or proposed rules may be considered for developing remedial alternative performance goals. These "to be considered" materials (TBCs) may provide useful information or recommended procedures that supplement, explain, or amplify the content of ARARs.

Each type of ARAR/TBC can be characterized further as chemical-specific, action-specific, or location-specific. A chemical-specific ARAR sets health and risk-based concentration limits in various environmental media for specific hazardous substances or contaminants. An action-specific ARAR sets performance, design, or other similar action-specific controls on particular remedial activities. A location-specific ARAR sets restrictions for conducting activities in particular locations, such as wetlands, floodplains, national historic districts, and others. The federal and New Jersey ARARs and TBCs utilized in the FS are presented in Tables 2-2 through 2-4.

Under Section 121 of CERCLA, EPA may waive the need to attain an ARAR if one of the following conditions can be demonstrated:

- **Selection of Interim Remedy** - The remedial action selected is only part of a total remedial action that will attain the ARAR level or standard of control when completed.

- **Greater Risk to Human Health and Environment** - Compliance with the ARAR at the site will result in greater risk to human health and the environment than the alternative option chosen.

- **Technical Impracticability** - Compliance with the requirement is technically impracticable from an engineering perspective.

- **Equivalent Standard of Performance Attained** - The remedial action selected will attain a standard of performance that is equivalent to that required under the ARAR through use of another method or approach.

- **Inconsistent Application of State Requirements Would Result** - The state has not consistently applied, or demonstrated intention to apply consistently, the ARAR in similar circumstances at other remedial actions.

- **Fund Balancing** - Attainment of the ARAR would not provide a balance between the need for protection of public health or welfare and the environment and availability of fund amounts to respond to other sites presenting a threat to the public or environment, for fund financed cleanups only.

2.2.4 Development of RAOs

The following RAOs have been developed to address human health risks and environmental concerns related to elevated contaminant concentrations in soils and buildings at the facility:

- Prevent public exposure to contaminated soils and building dust that present an unacceptable risk to human health and the environment;
- Prevent/minimize the migration of contaminants in the soil and buildings;
- Restore contaminated soils and buildings to below ARAR-based levels or technically feasible levels for the protection of human health and the environment; and
- Allow for the beneficial use of the property.

2.3 General Response Actions

The following GRAs for soils and building dust were identified to address the RAOs presented above: No Action, Limited Action, Containment, Removal/Treatment, and Disposal Actions.

No Action includes no monitoring, containment, or removal and does not achieve the RAOs; however, a No Action alternative is required under CERCLA as a baseline for comparison of other alternatives.

Limited Action includes monitoring, public information programs to educate the community about potential hazards, and access and use restrictions for the contaminated soils and buildings. Continued monitoring of the soils over time would facilitate determination of natural restoration rates.

Containment actions include technologies that involve little or no treatment, but provide protection of human health and the environment by reducing mobility of contaminants and/or eliminating exposure pathways.

Removal/Treatment actions include soil excavation, building decontamination/demolition, and treatment technologies (both *in situ* and *ex situ*) that actively reduce the volume, mobility and/or toxicity of contaminants. Treatment technologies include physical, chemical, or biological treatment.

Disposal actions include on-site reuse, on-site landfill, or off-site disposal.

2.4 Identification and Screening of Technology Types and Process Options

The screening of remedial technologies and process options was performed in two steps: 1) identification and screening of technology types and process options within each of the GRAs; and 2) evaluation and selection of representative process options for alternative development.

2.4.1 Identification and Screening of Technologies

The remedial technology types associated with each of the GRAs typically considered for the cleanup of contaminated soil and buildings were developed from the *"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA-Interim Final"* (EPA, 1988a), the *"Technology Screening Guide for Treatment of CERCLA Soils and Sludges"* (EPA, 1988b), the *"Revised Handbook for Remedial Action at Waste Disposal Sites"* (EPA, 1985), and experience on other hazardous wastes projects.

Remedial technology types associated with each GRA are identified in Table 2-5 for soils and Table 2-6 for buildings. Most of these remedial technology types contain several different process options that could apply to the contaminated soil and buildings. The screening of technology types and process options was based on technical implementability and effectiveness considering property conditions, contaminant types and concentrations as summarized in Section 1.3 of this report and the Remedial Investigation Report for OU-2 (TtFW, 2002).

2.4.1.1 Screening of Soil Remediation Technologies

In the following section, potential remedial technologies are briefly described and summarized with the results of the initial screening. For those technologies that were not retained for further evaluation, the rationale for their elimination is included. The screening evaluations for each identified technology for contaminated soil are summarized in Table 2-7.

2.4.1.1.1 No Action

No Action is not a category of technologies but an approach that does not include implementation of any remedial measures and is included in the FS as a baseline remedial option as required by CERCLA. No Action includes five-year reviews of site conditions to assess the need for future remedial actions.

Initial Screening: No Action would not provide for any remedial action. Natural attenuation would be an insignificant contributor to any reduction in contaminant toxicity, mobility, or volume. The No Action alternative would not limit community exposure to the contaminants. Although No Action would not meet the remedial objectives, it is retained for further consideration as a baseline for comparison of other alternatives.

2.4.1.1.2 Limited Action

Limited Action is a group of activities, which would not treat the contaminants in the soil but would restrict or minimize public exposure to contaminants. The Limited Action response includes soil monitoring, institutional controls and engineering controls.

Soil Monitoring

Soil monitoring includes collection and analyses of soil samples to assess the current levels of contamination, and evaluate if attenuation is occurring or if an alternative remedial strategy may be necessary. Both surface and subsurface soil samples would be collected.

<u>Initial Screening:</u> Soil monitoring does not meet the RAOs, but may be a necessary component of remedial alternatives that leave contamination on-site, and is therefore retained for further consideration.

Institutional Controls

Institutional controls include administrative measures, such as public meetings, notifications and deed notices or restrictions, to inform the public about potential risks associated with the facility, and to prohibit future unrestricted use inconsistent with site conditions. It would be necessary to obtain the property owner's consent prior to imposing use restrictions on the property.

<u>Initial Screening:</u> Institutional controls would not meet all of the remedial objectives for OU-2, but would potentially reduce public exposure to contaminated soil through public information programs and/or use restrictions placed on the property. Institutional controls are therefore retained for further consideration.

Engineering Controls

Engineering controls include physical measures to restrict access to contaminated media, including fencing, signage, etc. These measures are most effective when implemented in conjunction with institutional controls.

<u>Initial Screening:</u> Engineering controls would not meet all of the remedial objectives for OU-2, but would mitigate exposure to contaminants, thereby reducing risk to human health and the environment. Engineering controls are therefore retained for further consideration.

2.4.1.1.3 Containment

Containment is a remedial action providing isolation of contaminated soil from potential receptors and/or uncontaminated media. Capping technologies can be used to contain contaminated soil, minimize human exposure to soil, reduce leaching of contaminants from the soil to groundwater, and/or minimize exposure of ecological receptors. Capping of contaminated soil could be achieved by utilizing soil caps, clay caps, asphalt caps, or multi-layer caps. Additionally, any "hardscape" surfaces (*e.g.*, building foundations, concrete walkways, asphalt parking areas) could be used in conjunction with the capping methods that follow.

Soil Cap

A soil cap can be installed over contaminated soil to prevent direct contact with contaminants. A soil cap would have a high permeability relative to clay, and would allow percolation of surface water, runoff, etc.

Initial Screening: Soil caps are susceptible to erosion from climatic and storm forces which can be mitigated with a properly maintained vegetative cover. Soil caps are also susceptible to settling, ponding of liquids, and naturally occurring invasions by burrowing animals and deep rooted vegetation if not properly maintained. However, a soil cover would be effective in reducing direct contact with contaminated soils. This option was retained for further consideration.

Clay Cap

Clay caps are commonly used as cover for lands that contain both hazardous and nonhazardous wastes. Bentonite, a natural clay with high swelling properties, is often mixed with soil and water to produce a low permeability layer. A low permeability clay cap would not only physically isolate the source, but also reduce the potential for leaching of contaminants to groundwater by creating a low permeability barrier.

Initial Screening: Clay, which consists of fine material, is susceptible to erosion from climatic and storm forces which can be mitigated with a properly maintained vegetative cover. Proper particle distribution is essential to create a low permeability cap. Clay caps are also susceptible to cracking, settling, ponding of liquids, and naturally occurring invasions by burrowing animals and deep rooted vegetation if not properly maintained. A clay cap would be effective in achieving RAOs for soil including reducing direct contact with contaminated soils. This option was retained for further consideration.

Asphalt Cap

An asphalt cap would consist of a gravel sub-base with asphalt paving as a final cover. The cap minimizes wind and rain erosion, preserves slope stability, provides protection from the elements for layers below it, provides an effective component for the site's stormwater management program, also reduce the potential for leaching of contaminants to groundwater by creating a low permeability barrier.

Initial Screening: An asphalt cap provides a low permeability cover to contain contaminated areas. It is less susceptible to erosion from climatic and storm forces than a soil or clay cap. An asphalt cap is subject to cracking and settling if not properly maintained. However, it would be effective in achieving RAOs for soil, including reducing direct contact with contaminated soils. This option was retained for further consideration.

Multi-Layer Cap

The multi-layer cap is a combination of two or more of the single layer capping technologies. The disadvantage of one can be compensated by the advantage of another. Most caps recommended for hazardous waste projects are multi-layer caps such as a three layered system. Contaminated soil is covered with a composite cap consisting of a vegetative layer, a drainage layer, and a low permeability layer.

Initial Screening: The performance of a properly installed, multi-layered cap is generally excellent. However, over time, the integrity of the low permeability synthetic layer becomes uncertain and should be investigated regularly. A multiple layer cap would be effective in achieving RAOs for soil including reducing direct contact with contaminated soils. Therefore, this option was retained for further consideration.

2.4.1.1.4 Removal

This process involves the excavation of contaminated soils. This category employs typical construction equipment such as backhoes, bulldozers, front-end loaders, and draglines. Excavation is a preliminary or support technology and is often utilized in conjunction with other remedial actions, which first require removal of the contaminated soil.

Initial Screening: Excavation is required as the initial materials handling step in other remedial actions. One or more types of excavation equipment would be used in the excavation of contaminated soil for final treatment and/or disposal. Removal is therefore retained for further consideration.

2.4.1.1.5 Treatment

Treatment technologies are utilized to change the physical or chemical state of a contaminant, destroy the contaminant completely, or reduce contaminant volume, toxicity, or mobility.

Physical Treatment

Physical treatment is a category of technologies which utilize changes in physical properties of contaminants to reduce their toxicity, mobility or volume. This category of technologies includes reuse/recycling, solidification/stabilization, and soil washing.

Reuse/Recycling

Impacted material is used as part of a process in manufacturing a useful and saleable product, such as cement clinker, bricks, or asphalt.

Initial Screening: It may be difficult to find appropriate facilities due to hauling distances, media volume, material restrictions, sampling requirements, and costs. It may not be possible to reuse metals or PCB contaminated soils. However, this technology was retained, as some of the site materials may be suitable for reuse or recycling.

Solidification/Stabilization

Stabilization is a process whereby contaminated soils are converted into a stable cement type matrix in which contaminants are bound or trapped and become immobile. Silicates can stabilize contaminants such as metals and some organics in soil. It has been demonstrated that chemical fixation products of certain silicate-base mixtures can meet the hazardous waste TCLP tests.

Initial Screening: This process would be effective for the contaminated soil. This technology would immobilize contaminants in the soil matrix and would require long-term monitoring at the point of disposal. Stabilization can be done either by on-site mobile units or at off-site commercial facilities. This technology was retained for further evaluation.

Soil Washing

Soil washing is a separation process whereby contaminants sorbed onto the fines portion of soil are separated in a water-based system from the containing medium. The water wash may be augmented with a leaching agent, surfactant, pH adjustment, or a chelating agent to help in removal. The process separates contaminants from soil in one of two ways: 1) by dissolving/suspending contaminants in the wash solution, or 2) by concentrating the contaminants into a smaller volume of soil through screening, gravity separation, and attrition scrubbing.

Initial Screening: Soil washing is considered a media transfer technology. The contaminated water from the separation process requires additional treatment by the appropriate technology(s) for the contaminants of concern. The treated silt and clay fraction may potentially be disposed off-site without further treatment at a non-hazardous landfill or may be re-used in conjunction with a non-hazardous capping system. This technology would have limited effectiveness for the contaminants of concern, specifically PCBs, due to their low solubility, and was therefore eliminated from further evaluation.

Chemical Treatment

Chemical treatment is a category of technologies which utilize chemical reactions to reduce the toxicity, mobility or volume of contaminants. This category of technologies includes lime neutralization, chemical oxidation, chemical dehalogenation, and chemical extraction.

Lime Neutralization

Lime addition neutralizes acids in the soil by raising the pH.

Initial Screening: Lime neutralization only treats a very small portion of site contaminants and there is some difficulty in maintaining the correct pH. This technology is therefore eliminated from further evaluation.

Chemical Oxidation

An oxidizing agent, such as hydrogen peroxide, reacts with the soil and breaks down the organic constituents into carbon dioxide and water.

Initial Screening: PCBs are resistant to chemical oxidation. Dioxins are not readily oxidized chemically. Also, bench-scale testing and field pilot studies are necessary to determine the operational conditions for this type of remediation. This technology is therefore eliminated from further evaluation.

Chemical Dehalogenation

In dehalogenation, chemical reagents are added to soils contaminated with halogenated (chlorinated) organics in a heated slurry of reagents and soil. Dehalogenation is achieved by either the replacement of the halogen molecules or the decomposition and partial volatilization of the contaminants.

Initial Screening: The target contaminant groups for dehalogenation are halogenated SVOCs and pesticides. Alkali Metal Dechlorination (APEG) is one of the few processes other than incineration that has been successfully field tested in treating PCBs and is practical for small-scale applications. Therefore, dehalogenation has been retained for further consideration.

Chemical Extraction

Chemical extraction is a separation process which does not destroy the waste in soils, but instead separates them from the medium. This separation process decreases the volume of waste that must be additionally treated or disposed. In chemical extraction, waste-contaminated soil and an extractant are mixed in an extractor, thereby dissolving the contaminants. The extracted solution is then placed in a separator, where contaminants and extractants are separated for further treatment and re-use, respectively.

Initial Screening: The chemicals of concern may be able to be extracted from the contaminated soil using this technology, thereby significantly reducing the volume of contaminated media to be managed. Therefore, this technology was retained for further evaluation.

Biological Treatment

Biological treatment is a biochemical process in which organics are broken down to simpler substances by microorganisms. Biological treatment technologies considered are aerobic biodegradation, anaerobic biodegradation, and phytoremediation.

Aerobic Biodegradation

Organic molecules are oxidized to carbon dioxide (CO_2), water, and other innocuous end products using molecular oxygen as the terminal electron acceptor. Oxygen may also be incorporated into intermediate products of microbial catabolism through the action of oxidizing enzymes, making them more susceptible to further biodegradation. In general, aerobic biodegradation processes are used more often than an aerobic process for biodegradation because the degradation process is more rapid and more complete, and offensive end products (*i.e.*, methane, hydrogen sulfide) are not produced.

Initial Screening: While aerobic biodegradation has been demonstrated to be effective on some non-chlorinated organics such as benzene, toluene and xylene, uncertainty exists regarding its effectiveness in remediating the chlorinated organics known to be present at the facility, particularly PCBs. Therefore, this technology is eliminated from further evaluation.

Anaerobic Biodegradation

Organics are broken down to methane, cellular biomass, and intermediate organic compounds via anaerobic respiration (in an oxygen-free environment). This is accomplished by facultative and obligate anaerobes. The strict anaerobes require totally oxygen-free environments and an oxidation/reduction potential of less than -0.2 Volt.

Initial Screening: Anaerobic biodegradation can degrade certain halogenated organics, including PCBs. Anaerobic biodegradation is not applicable for metals, and is not a well-established full-scale remedial technology for PCBs. Therefore, this technology is eliminated from further evaluation.

Phytoremediation

Phytoremediation is the use of hybrid plants to extract contaminants from contaminated media. Specially selected plants known to be effective for such purposes are planted and allowed to grow. As the plants grow they absorb contaminants. The plants are then harvested and either incinerated or composted.

For example, the Indian mustard plant has been the subject of much investigation into its potential for extracting contaminants from soil. It has been shown to be effective in absorbing high amounts of lead, chromium, copper, and other heavy metals, as well as PAHs, into its stalks and leaves. The roots typically reach about 20 inches into the ground. If the plants are incinerated after harvest, they leave behind an ash that is valuable for its content of metal, which may exceed 40 percent.

Initial Screening: This technology is effective in removing metals and PAHs and is low in cost but has not been demonstrated as an effective full-scale remedial technology for PCBs. In addition, this process option would not be effective for treating contamination at depths greater than a few feet. Therefore, phytoremediation is eliminated from further consideration.

Thermal Treatment

Thermal treatment is a technology category which employs thermal energy to treat contaminated media and reduces contaminant volume, toxicity, and mobility. The process options included in this technology category are thermal desorption, incineration and pyrolysis.

Low/High Temperature Thermal Desorption

The thermal desorption technology is a thermal stripping process. Prepared soils are introduced into the enclosed heated chamber using a heated screw or belt conveyor. Direct or indirect heating methods are used to volatilize organics from the soil. The off-gas containing the thermally stripped compounds is then combusted in an afterburner, adsorbed in a carbon adsorption unit or treated by catalytic oxidation designed to ensure removal of these compounds. Typical operating temperatures for thermal stripping of organics are 400°F to 900°F.

Initial Screening: Thermal stripping is similar to the primary chamber of incineration technology but operates at lower temperatures. This technology can be performed either by on-site mobile units or at off-site commercial facilities. This technology is applicable and effective for contaminated soils at the facility, and was retained for further consideration.

Incineration

Incineration is a thermally destructive method used to volatilize and combust (in the presence of oxygen) all forms of combustible waste materials and organic contaminants in soil. Incineration units such as multiple hearth, rotary kiln, infrared incineration, and fluidized bed incineration systems treat organic contaminants at high temperatures (1,200°F to 2,400°F). The destruction and removal efficiency (DRE) for properly maintained/operated incinerators exceeds the 99.99 percent requirement for hazardous wastes and can be operated at the 99.9999 percent DRE requirement for PCBs and dioxins.

Initial Screening: High temperature incineration is best suited for the destruction of VOC and SVOC organics, PCBs, dioxins, and pesticides in soil. Off-gases and combustion residuals generally require treatment. Incineration can be performed either by on-site mobile units or at off-site commercial facilities. Incineration is the best-demonstrated technology used to remediate organic contaminants in soil and is therefore retained for further consideration.

Pyrolysis

Pyrolysis is a chemical decomposition process, which is induced in organic materials by applying heat in the absence of oxygen. Organic materials are transformed into gaseous components and a solid residue (coke) containing fixed carbon and ash. In practice, pyrolysis is operated at less than stoichiometric quantities of oxygen, under pressure, and at operating temperatures above 800°F.

Initial Screening: Pyrolysis systems can be applicable for a number of organic materials that undergo a chemical decomposition in the presence of heat and has shown promise in treating organic contaminants in soils and sludges, but is not feasible for streams with high concentrations of metals or inorganics. This is not a conventional full-scale technology and is eliminated from further consideration.

In Situ Treatment

In situ treatment is a technology category in which contaminated soil is treated "in place" without excavation. The *in situ* technologies evaluated in this category are biodegradation, oxidation, solidification/stabilization, soil washing, hot air/steam injection, soil vapor extraction (SVE), and vitrification.

In Situ Biodegradation

Biological treatment involves the use of native microbes or selectively adapted bacteria to degrade a variety of organic compounds. The biological processes usually involve the addition of microbes, nutrients, and oxygen (aerobic bioreclamation only), as well as the recirculation of contaminated groundwater. The applicability of a bioreclamation approach is determined by the biodegradability of the organic contaminants, and environmental factors affecting microbial activity. *In situ* biodegradation can be either aerobic or anaerobic depending upon the contaminants present on the site.

Initial Screening: *In situ* biodegradation is not a widely employed technology for hazardous waste cleanup which requires extensive bench and pilot-scale testing to verify its effectiveness. While biodegradation has been demonstrated to be effective on some organics, it is not applicable for the removal of metals and is not sufficiently advanced to assure removal of PCBs. Therefore, *in situ* biodegradation was eliminated from further consideration.

In Situ Oxidation

This technology involves the use of a chemical reagent that is injected into the contaminated media via constructed wells or driven wellpoints to break down the organic constituents. The amount of reagent needed, spacing of injection points, and the frequency of addition to achieve cleanup goals are dependent upon organic constituent concentrations.

Initial Screening: The treatment technology can best be applied to contaminated media impacted with high molecular weight organic constituents, although field pilot studies would be necessary to further refine the operational conditions of this technology. Additionally, PCBs are resistant to oxidation and dioxins are not readily oxidized. Therefore, this technology is eliminated from further evaluation.

In Situ Solidification/Stabilization

In situ solidification/stabilization is a process whereby contaminated soils are converted in-place into a stable cement type matrix in which contaminants are bound or trapped and become immobile. Silicates can stabilize contaminants such as metals and some organics, including low concentrations of PAHs. It has been demonstrated that chemical fixation products of certain silicate-base mixtures do not leach metals and most organics.

Initial Screening: This process would be effective for treatment of the contaminated soil. This technology would immobilize contaminants in the soil matrix and would require long term monitoring at the facility. Field testing is required to identify the site-specific appropriate additives and dosage rates. This technology was retained for further evaluation as a process option.

In Situ Soil Washing

Soil washing is the *in situ* extraction of inorganic or organic compounds from soil by passing appropriate extractant solutions through the soils to dissolve or solubilize contaminants. The area to be treated must be isolated by vertical and horizontal groundwater containment barriers. Water or an aqueous solution is flooded or injected into the area of contamination and the contaminated elutriate is collected at the surface for removal, recirculation, on-site treatment, or reinjection. During elutriation, sorbed contaminants are mobilized into solution by the dissolution process, formation of an emulsion, or by chemical reaction with the flushing solution. These solutions may include water, surfactants, acids or bases, chelating agents, or oxidizing and reducing agents.

Initial Screening: A large volume of wastewater would be generated due to multiple flushing steps to treat the contaminants of concern and would require collection and management via treatment and discharge. Significant hydraulic controls would be required for the very large area of contamination present at the facility. In addition, soil flushing is not amenable to the heterogeneous soil. Therefore, *in situ* soil washing was eliminated from further consideration as a process option.

In Situ Hot Air/Steam Injection

Hot air or steam is injected below the contaminated zone to heat up contaminated soil. The heating enhances the release of contaminants from the soil matrix. Some VOCs and SVOCs are stripped from the contaminated zone and brought to the surface through soil vapor extraction.

Initial Screening: Debris or other large objects buried in the media can cause operating difficulties. Soil with highly variable permeabilities may result in uneven delivery of gas flow to the contaminated regions. Air emissions may need to be regulated to eliminate possible harm to the public and the environment. This technology was not retained for further evaluation.

In Situ Soil Vapor Extraction

A vacuum is drawn through extraction wells to create a pressure/concentration gradient that induces gas-phase volatiles to be removed from soil through extraction wells. This technology also is known as *in situ* soil venting, *in situ* volatilization, enhanced volatilization, or soil vacuum extraction.

Initial Screening: *In situ* SVE will not remove heavy oils, metals, PCBs, or dioxins but will remove gas-phase volatiles from the matrix. Because the process involves the continuous flow of air through the soil, however, it often promotes the *in situ* biodegradation of low-volatility organic compounds that may be present. This technology was retained for further evaluation.

In Situ Vitrification

In situ vitrification (ISV) typically uses an electric current to melt soil or other earthen materials at extremely high temperatures (1,600 to 2,000 °C or 2,900 to 3,650 °F) and thereby immobilize most inorganics and destroy organic pollutants by pyrolysis. Inorganic pollutants are incorporated within the vitrified glass and crystalline mass. Water vapor and organic pyrolysis combustion products are captured in a hood, which draws the contaminants into an off-gas treatment system that removes particulates and other pollutants from the gas. The vitrification product is a chemically stable, leach-resistant glass and crystalline material similar to obsidian or basalt rock. The process destroys and/or removes organic materials. Radionuclides and heavy metals are retained within the molten soil.

Initial Screening: The ISV process can destroy or remove organics and immobilize most inorganics in contaminated soils, sludge, or other earthen materials. The process has been tested on a broad range of VOCs and SVOCs, other organics including dioxins and PCBs, and on most priority pollutant metals and radionuclides. However, ISV requires large amounts of power and is typically only used for radiological encapsulation. Therefore, *in situ* vitrification was eliminated from further consideration as a process option.

Vapor Phase Emission Control

The application and operation of certain treatment technologies may potentially involve vapor phase emissions. Air emission regulations may require that gaseous streams containing organic and inorganic contaminants undergo treatment or removal prior to discharge to the atmosphere. Potential treatment technologies include vapor phase carbon adsorption, incineration (afterburner), and catalytic oxidation.

Vapor Phase Carbon Adsorption

Adsorption treats vapor phase emissions by essentially transferring and concentrating volatile organics (the adsorbate) from one medium (vapor/gaseous stream) to another (adsorbent). The adsorbent is typically granular activated carbon (GAC). Multiple carbon bed vessels are typically needed to achieve adequate contact time.

Initial Screening: Vapor phase carbon adsorption is a well-established technology for treating vapor emissions. It is a highly effective technology and provides a flexible method to comply with air regulations. This technology does not destroy contaminants, but decreases contaminant mobility and volume while increasing contaminant concentration in the adsorbent. Off-site disposal or regeneration of GAC is required. This technology was retained for further evaluation.

Incineration (Afterburner)

The incineration or afterburner process is a thermally destructive method, which can be employed to destroy organic contaminants in the vapor phase.

Initial Screening: External energy sources are generally required for this technology. Incineration is a destructive technology while vapor phase GAC is not. Afterburner treatment may not be cost effective unless incineration is the chosen technology to treat contaminated soil on-site. This technology was retained for further evaluation.

Catalytic Oxidation

Catalytic oxidation is a destructive technology in which vapor phase contaminants are oxidized in the presence of a catalyst.

Initial Screening: This technology may be employed as a final vapor phase treatment for organic vapors generated during different treatment process options. An external energy source is generally required for this technology. This technology was retained for further evaluation.

2.4.1.1.6 Disposal

This category of remedial technologies refers to on-site and off-site disposal of contaminated soil or secondary wastes generated from treatment systems, with or without additional treatment. The disposal technologies included in the screening are on-site reuse, construction of a new on-site Resource Conservation and Recovery Act (RCRA), TSCA and/or non-hazardous landfill, and disposal at an existing off-site RCRA, TSCA, or non-hazardous landfill.

On-Site Reuse

This option allows for the redeposition or disposal of treated soil that does not exceed RCRA or TSCA limits.

Initial Screening: Treated soil and secondary wastes would be utilized to fill excavations and/or be otherwise revised on-site non-hazardous disposal area. Redeposition of treated soil would reduce the need for additional clean fill from an off-site source. Wastes from some treatment options may require institutional controls (land use restrictions) for re-use on-site. This technology was retained for further evaluation.

On-Site Landfill

A new disposal facility could possibly be constructed within the property boundaries. A typical landfill facility would consist of a liner system, a leachate collection and treatment system, and a multi-layer cap system including grass seeding. The collected leachate is either treated on-site or disposed at an off-site treatment facility.

Initial Screening: The on-site landfill must meet rigorous regulatory requirements and would require highly detailed engineering controls. The area needed for an on-site landfill is a fairly large area. This disposal option was retained for further consideration.

Off-Site Disposal

Contaminated soil and/or secondary wastes (*e.g.*, wastes from other treatment options) could be hauled to an existing RCRA Subtitle C or TSCA landfill, depending on the PCB concentrations of the excavated soil or wastes.

Initial Screening: Land Disposal Restrictions (LDRs) prohibit disposing of RCRA listed or characteristic wastes that do not meet LDR standards in a landfill. Soils that do not meet LDR standards must first be treated prior to disposal. Additionally, existing licensed non-hazardous/non-TSCA landfill within New Jersey or neighboring states could be employed for the disposal of treated soils and secondary wastes that were characterized as non-hazardous. The use of a RCRA Subtitle C landfill and/or TSCA landfill may also be required for disposal of excavated soil and secondary wastes from other treatment alternatives. This disposal option was retained for further evaluation.

2.4.1.2 Screening of Building Remediation Alternatives

In the following section, potential remedial technologies for contaminated buildings are briefly described and summarized with the results of the initial screening. For those technologies that where not retained for further evaluation, the rationale for their elimination is included. The screening evaluation for each identified technology for the buildings are summarized in Table 2-8.

2.4.1.2.1 No Action

No Action is not a category of technologies, but an approach that does not include implementation of any remedial measures and is included in the FS as a baseline remedial option as required by CERCLA. No Action includes five-year reviews of site conditions to assess future remedial actions if deemed necessary.

Initial Screening: No Action would not provide for any remedial action. Natural attenuation would be an insignificant contributor to any reduction in contaminant toxicity, mobility, or volume. The No Action alternative would not limit exposure to the contaminants. Although No Action would not meet the remedial objectives, it is retained for further consideration as a baseline for comparison of other alternatives.

2.4.1.2.2 Limited Action

Limited Action is also not a category of technologies, but a group of activities, which would not treat the contaminants in the buildings but would restrict or minimize exposure to the contaminants. Limited Action includes institutional controls, such as public awareness programs, and use restrictions.

Public Awareness Programs

Public meetings and notifications to the public and tenants are provided to make the public and tenants aware of the hazards associated with the buildings.

Initial Screening: Public awareness programs would not meet the remedial objectives for the OU-2 FS, but would potentially reduce exposure to the contaminated buildings. Public awareness programs were therefore retained for further consideration.

Institutional Controls

Use restrictions, similar to a deed notice, could be implemented to limit exposure to contaminants by specifying allowable activities in the buildings. It would be necessary to obtain the property owners consent prior to imposing use restrictions.

Initial Screening: Use restrictions could potentially mitigate exposures to contaminants in the buildings and are retained for future consideration.

2.4.1.2.3 Containment

Containment is a remedial action providing isolation of the contaminated building dust from potential receptors and/or uncontaminated media. Encapsulation and surface sealing technologies performed in accordance with 40 CFR 761.30(p)for porous surfaces and 40 CFR 761.79 for non-porous surfaces can be used to contain contaminated dust, minimize human exposure, and/or minimize exposure of ecological receptors.

Initial Screening: Decontamination of non-porous surface and surface encapsulation (*e.g.*, epoxy coating) of porous surfaces allows PCB-contaminated surfaces to be managed in place while they remain in service, provided that they are surface washed, encapsulated, and marked to indicate the presence of PCBs. This option is retained for further consideration.

2.4.1.2.4 Removal

The technology involves the large-scale destruction of buildings and equipment, followed by removal of debris. Demolished and excavated material could be loaded onto trucks for off-site disposal, treated on-site, and/or consolidated with other on-site material.

Initial Screening: Demolition can readily handle the number and size of buildings present at the site, however, large amounts of debris will require disposal. Traditional construction equipment can be used for this effort. This option was retained for further consideration.

2.4.1.2.5 Treatment

This technology involves the removal of surface contamination by decontamination through the implementation of 40 CFR 761.30(p) for porous surfaces and 40 CFR 761.79 for non-porous surfaces. Materials from which PCBs have been removed using these procedures may be used and re-used under 761.80 (u).

Initial Screening: Decontamination technologies (*e.g.*, vacuum/pressure wash, acid etch, scarification, and wipe/solvent wash) have been proven effective in removal of surface contamination at other hazardous waste sites. However, aqueous wash waste would require further treatment, and pilot testing of decontamination technologies would be required to evaluate site-specific requirements. This option was retained for further consideration.

2.4.1.2.6 Disposal

This category of remedial technologies refers to on-site and off-site disposal of contaminated building debris or secondary wastes generated from treatment systems, with or without additional treatment. The disposal technologies included in the screening are on-site reuse, construction of a new on-site RCRA, TSCA, and/or nonhazardous landfill, and disposal at an existing off-site RCRA, TSCA, and/or non-hazardous landfill.

On-Site Reuse

This option allows for the re-deposition or disposal of building debris that does not exceed RCRA or TSCA limits.

Initial Screening: Building debris and secondary wastes would be utilized to fill excavations. Reuse of building debris would reduce the need for additional clean fill from an off-site source. Wastes from some treatment options might require institutional controls such as land use restrictions. Re-use on-site was retained for further evaluation.

On-Site Landfill

This option would involve construction of a new disposal facility within the site boundaries. A typical landfill facility would consist of a liner system, a leachate collection and treatment system, and a multi-layer cap system including grass seeding. The collected leachate would either be treated on-site or disposed of at an off-site treatment facility.

Initial Screening: The on-site landfill must meet rigorous regulatory requirements and would require highly detailed engineering controls. The area needed for an on-site landfill would be a fairly large area. This disposal option was retained for further consideration.

Off-Site Disposal

Contaminated building debris along with secondary wastes (*e.g.*, wastes from other treatment options) could be hauled to an existing RCRA Subtitle C or TSCA landfill, depending on the PCB concentrations of the debris.

Initial Screening: LDRs prohibit disposing of RCRA listed or characteristic wastes that do not meet LDR standards in a landfill. Debris that does not meet LDR standards must first be treated prior to disposal. Additionally, an existing licensed non-hazardous/non-TSCA landfill within New Jersey or a neighboring state could be employed for the disposal of debris and secondary wastes that were characterized as non-hazardous. The use of a RCRA Subtitle C and/or TSCA landfill may also be required for disposal of contaminated debris and secondary wastes from other treatment alternatives. This disposal option was therefore retained for further evaluation.

2.4.2 Evaluation and Selection of Representative Process Options

Process options for the technically feasible actions were evaluated prior to selecting a particular process option to represent each technology type. In some cases, more than one process option was selected for a particular technology type if the process option data indicated sufficient differences in option performance. Process options were evaluated for effectiveness, implementability, and cost as described below:

- The evaluation of technology option effectiveness focused on: 1) effectiveness in handling the estimated areas or volumes of soil and the contaminated building dust, and the ability to meet contaminant reduction goals; 2) effectiveness of protecting human health and the environment during the construction and implementation phases; and 3) reliability of the technology with respect to contaminants and conditions at the facility.

- The implementability evaluation consisted of an assessment of the technical and administrative difficulty of implementing a technology or process option.

- Cost evaluation relied upon engineering judgment to arrive at the relative cost of process options within a technology type.

For soils, feasible remedial technologies and process options that passed the initial screening (Section 2.4.1) were evaluated using effectiveness, implementability, and cost factors. The evaluation and selection of process options for soil treatment technologies are presented on Table 2-9. The process options that were selected for alternative development based on the evaluation are noted on the table with an asterisk (*). As discussed previously, all of the process options presented on Table 2-9 passed the initial screening and could be incorporated into the remedial design.

For buildings, feasible remedial technologies and process options that passed the initial screening (Section 2.4.1) were evaluated using effectiveness, implementability, and cost factors. The evaluation and selection of process options for building treatment technologies is summarized on Table 2-10. The process options that were selected for alternative development based on the evaluation are noted on the table with an asterisk (*). As discussed previously, other process options could be substituted during remedial design.

SECTION 2

TABLES

TABLE 2-1 (Sheet 1 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHEMICALS OF POTENTIAL CONCERN (COPCs)

	Area A*		Area B*		
	Surface Soils	All Soils	Surface Soils	All Soils	Building Dust
Benzene	✓	✓	✓	✓	
Trichloroethene	✓	✓	✓	✓	
Benzo(a)anthracene	✓	✓	✓	✓	
Benzo(a)pyrene	✓	✓	✓	✓	
Benzo(b)fluoranthene	✓	✓	✓	✓	
Benzo(k)fluoranthene		✓	✓	✓	
Dibenz(a,h)anthracene	✓	✓	✓	✓	
Indeno(1,2,3-cd)pyrene	✓	✓	✓	✓	
Aldrin	✓	✓		✓	
Aroclor-1242	✓	✓		✓	
Aroclor-1248		✓		✓	
Aroclor-1254	✓	✓	✓	✓	✓
Aroclor-1260			✓		
Total PCBs	✓	✓	✓	✓	
Dioxin-like PCB Congeners			✓	✓	
Nondioxin-like PCB Congeners			✓	✓	
Dibenzofuran			✓	✓	
Acenaphthene			✓	✓	
Chrysene			✓	✓	
Fluoranthene			✓	✓	
Fluorene			✓	✓	
2-Methylnaphthalene		✓	✓	✓	
Naphthalene			✓	✓	
Phenanthrene			✓	✓	
Pyrene			✓	✓	
alpha-BHC		✓	✓	✓	
alpha-Chlordane		✓	✓	✓	
4,4'-DDE		✓	✓	✓	
4,4'-DDT			✓	✓	
Dieldrin		✓	✓	✓	
Endosulfan sulfate		✓		✓	
Endrin		✓		✓	
Endrin aldehyde			✓	✓	
gamma-Chlordane			✓	✓	
Heptachlor		✓	✓	✓	
Heptachlor epoxide		✓	✓	✓	
2,3,7,8-TCDD equivalents			✓	✓	
1,3-Dichlorobenzene				✓	
1,1-Dichloroethylene				✓	
cis-1,2-Dichloroethylene			✓	✓	
Tetrachloroethylene				✓	
Vinyl chloride				✓	
Carbazole				✓	
Acetophenone			✓	✓	
Aluminum	✓	✓	✓	✓	✓
Antimony	✓	✓	✓	✓	✓
Arsenic	✓	✓	✓	✓	✓

TABLE 2-1 (Sheet 2 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHEMICALS OF POTENTIAL CONCERN (COPCs)

	Area A*		Area B*		
	Surface Soils	All Soils	Surface Soils	All Soils	Building Dust
Barium	✓	✓	✓	✓	✓
Cadmium		✓	✓	✓	✓
Chromium (total)		✓	✓	✓	✓
Copper		✓		✓	✓
Iron	✓	✓	✓	✓	✓
Lead	✓	✓		✓	✓
Manganese	✓	✓	✓	✓	✓
Mercury		✓		✓	✓
Nickel		✓			✓
Silver				✓	✓
Thallium	✓	✓	✓	✓	✓
Vanadium		✓	✓	✓	✓
Zinc				✓	✓
Cyanide			✓	✓	

*** Note:** The facility was divided into two areas (Areas A and B) that reflected the historical use for purposes of managing the analytical data. Figure 6-2 of the Remedial Investigation Report for OU-2 shows the division of the property.

400193

TABLE 2-2 (Sheet 1 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
FEDERAL	Safe Drinking Water Act Regulations	40 CFR 141	Drinking water standards which apply to specific contaminants that have been determined to have an adverse impact on human health.	Drinking water standards, expressed as Maximum Contaminant Levels (MCLs), are ARARs for groundwater and/or surface water cleanup and replacement standards.
	Ambient Water Quality Criteria	Guidance Criteria	Guidelines established for the protection of human health and/or aquatic organisms.	ARAR for contaminants that lack a promulgated MCL, otherwise criteria are considered TBCs.
	RCRA Groundwater Protection Standards	40 CFR 264.94	Maximum constituent concentrations for groundwater protection at hazardous waste management facilities.	ARAR for groundwater cleanup and replacement standards.
	Toxic Substances Control Act	40 CFR 761.61	Requirements for remediation of PCB contamination dependent on the anticipated use of the property.	ARAR for on-site removal/containment of PCB contamination.

400194

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
STATE	Surface Water Quality Standards	NJAC 7:9B	Water quality standards for various classes of surface waters.	ARAR for surface water cleanup standards and/or effluent limitations on discharges to surface waters.
	Groundwater Quality Standards	NJAC 7:9-6	Groundwater quality standards for various classes of groundwater.	ARAR for groundwater cleanup and replacement where more stringent than MCLs.
	Safe Drinking Water Act Standards	NJAC 7:10-5.2	Contains the state's discretionary changes to the federal drinking water standards.	Drinking water standards, expressed as MCLs, are ARARs for groundwater and/or surface water cleanup and replacement standards.
	Industrial Site Recovery Act	NJSA 13:1K	Requires soil remediation standards for human carcinogens in excess of established standards.	ARAR for setting soil remediation criteria where more stringent than federal risk standards.
	Soil Cleanup Criteria	State Guidance	Sets restricted (non-residential) and un-restricted (residential) soil cleanup standards.	TBC for contaminants in on-site soils.

TABLE 2-3 (Sheet 1 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
FEDERAL	Protection of Wetlands	Executive Order 11990	Requires consideration of impacts to wetlands in order to minimize their destruction, loss or degradation and to preserve/enhance wetland values.	ARAR for activities which would impact wetlands.
	Protection of Floodplains	Executive Order 11988	Requires consideration of impacts to floodplain areas in order to reduce flood loss risks, minimize flood impacts on human health, safety and welfare, and preserve/restore floodplain values.	ARAR for activities occurring within the 100-year floodplain.
	Clean Water Act, Section 404(b)(1) Guidelines	40 CFR 230.10	Establishes criteria for evaluating impacts to waters of the US (including wetlands) and sets forth factors for considering mitigation measures.	ARAR for the placement of fill material into on-site wetlands.
	Resource Conservation and Recovery Act Regulations- Location Standards	40 CFR 264.18	Regulates the design, construction, operation and maintenance of hazardous waste management facilities within the 100-year floodplain.	ARAR for on-site treatment, storage or disposal of hazardous waste.

400196

TABLE 2-3 (Sheet 2 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
FEDERAL (Cont'd)	National Historic Preservation Act, 1966, as Amended. Section 106	36 CFR 800 16 USC 470	Section 106 of the NHPA is a process that requires federal agencies to take into consideration the effects of their undertakings on cultural resources (including standing structures, historic landscapes, and prehistoric and historic period archeological resources) that qualify for listing in the NRHP. The process obligates the federal agency to identify historic properties that may be affected, assess adverse effects of proposed undertakings, resolve adverse effects (develop a Memorandum of Agreement [MOA] that outlines agreed-upon measures to be taken to avoid, minimize, or mitigate adverse effects), and implement the MOA(s). Throughout the process, the Advisory Council on Historic Preservation (ACHP) is also afforded a reasonable opportunity to comment and federal agencies are obliged to involve the public and identify other potential consulting parties.	ARAR for effects to cultural resources.
STATE	Flood Hazard Area Regulations	NJAC 7:13	Regulates the placement of fill, grading, excavation and other disturbances within the defined flood hazard area/floodplain of rivers/streams.	ARAR for site activities occurring within the flood hazard area or floodplain of on-site rivers/streams.
	Freshwater Wetlands Protection Act Rules	NJAC 7:7A	Regulates the disturbance or alteration of freshwater wetlands and their respective buffers.	ARAR for site activities disturbing freshwater wetlands and buffer areas.

Note: The southeast portion of the facility (currently underdeveloped) is within the flood hazard area and the 100- and 500-year floodplain.

TABLE 2-4 (Sheet 1 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
FEDERAL	RCRA - Hazardous Waste Generation	40 CFR 262	Specifies requirements for hazardous waste packaging, labeling, manifesting and storage.	ARAR for on-site storage of hazardous waste.
	RCRA - Transportation of Hazardous Waste	40 CFR 263	Specifies requirements for transporters of hazardous waste to obtain an EPA identification number, and comply with manifest and spill response procedures.	ARAR for the use of transporters for off-site disposal of hazardous waste.
	RCRA - Treatment, Storage and Disposal of Hazardous Waste	40 CFR 264/265	Specifies requirements for the operation of hazardous waste treatment, storage and disposal facilities.	ARAR for on-site hazardous waste treatment and storage and disposal activities.
	RCRA - Land Disposal Restrictions	40 CFR 268	Sets out prohibitions and establishes standards for the land disposal of hazardous wastes.	ARAR for on-site hazardous waste disposal activities.
	Toxic Substances Control Act	40 CFR 761.61	Specifies requirements for the storage and disposal of PCB contaminated remediation wastes.	ARAR for on-site management of PCB contaminated wastes.
		40 CFR761.30(p) 40 CFR 761.79 40 CFR 761 subpart S	Provide standards and procedures for decontamination of porous and non-porous surfaces.	ARAR for surface decontamination of PCB-contaminated materials.
	Clean Air Act - National Ambient Air Quality Standards- Particulates	40 CFR 50	Establishes maximum concentrations for particulates and fugitive dust emissions.	ARAR for on-site activities which would generate particulate emissions.
	Clean Water Act Effluent Guidelines and Standards	40 CFR 401	Provides requirements for point source discharges of pollutants.	ARAR for discharges of wastewaters to surface water bodies.

400198

TABLE 2-4 (Sheet 2 of 2)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ACTION-SPECIFIC APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs) AND REQUIREMENTS TO BE CONSIDERED (TBCs)

ARAR/TBC TYPE	REQUIREMENT	CITATION	DESCRIPTION	COMMENTS
FEDERAL (Cont'd)	Clean Water Act Stormwater Program	40 CFR 122	Regulates the discharge of stormwater from industrial activities.	ARAR for point source discharges of stormwater to surface waters.
	USDOT Hazardous Materials Transportation Regulations	49 CFR 171-180	Establishes classification, packaging and labeling requirements for shipments of hazardous materials.	ARAR for the preparation of hazardous materials generated on-site for off-site shipment.
	EPA Test Methods for Evaluation of Solid Waste	SW-846	Establishes analytical requirements for testing and evaluating solid/hazardous wastes.	TBC for testing waste samples.
STATE	Hazardous Waste Management Regulations	NJAC 7:26G	Provides requirements for the generation, accumulation, on-site management, and transportation of hazardous waste.	ARAR for on-site management and disposal of hazardous waste.
	New Jersey Pollution Discharge Elimination System (NJPDES) Regulations	NJAC 7:14A	Rules regarding discharges of wastewater to surface waters, groundwater and publicly owned treatment works.	ARAR for the discharge of treated wastewaters to either surface water or groundwater.
	Air Quality Regulations	NJAC 7:27	Provides requirements applicable to air pollution sources.	ARAR for the generation and emission of air pollutants.
	Technical Requirements for Site Remediation	NJAC 7:26E	Specifies standards for delineation sampling and analysis at remediation sites.	ARAR for sampling and analysis of site contaminants.
	Treatment Works Approvals	NJAC 7:14A-22	Design and construction standards for wastewater treatment systems.	ARAR for on-site treatment of wastewater.
	Soil Erosion and Sediment Control	NJSA 4:24	Requires the implementation of soil erosion and sediment control measures for activities disturbing over 5,000 square feet of surface area of land.	ARAR for site activities involving excavation, grading or other soil disturbance activities exceeding 5,000 square feet.

TABLE 2-5
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
GENERAL RESPONSE ACTIONS, TECHNOLOGY TYPES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Types	Process Options
- No Action	- No Action	None.
- Limited Action	- Soil Monitoring	Soil samples are collected and analyzed.
	- Institutional Controls	Inform local officials, hold public meetings, deed notice, use restrictions
	- Engineering Controls	Access restrictions
- Containment	- Containment	Soil cap, clay cap, asphalt cap, multi-layer cap.
- Removal/Treatment/Disposal	<u>Removal Technologies</u>	
	- Excavation	Excavation of soils above action levels, hot-spot removal.
	<u>Treatment Technologies</u>	
	- Physical Treatment	Reuse/recycling, solidification/stabilization, soil washing.
	- Chemical Treatment	Lime neutralization, chemical oxidation, chemical dehalogenation, chemical extraction.
	- Biological Treatment	Aerobic biodegradation, anaerobic biodegradation, phytoremediation.
	- Thermal Treatment	Thermal desorption, incineration, pyrolysis.
	- *In situ* Treatment	*In situ* biodegradation, *in situ* oxidation, *in situ* solidification/ stabilization, *in situ* soil washing, *in situ* hot air/steam injection, *in situ* soil vapor extraction (SVE), *in situ* vitrification.
	- Vapor Phase Emission Control	Carbon adsorption, incineration, catalytic oxidation.
	<u>Disposal Technologies</u>	
	- Disposal	On-site reuse, on-site landfill, off-site disposal.

400200

TABLE 2-6
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
GENERAL RESPONSE ACTIONS, TECHNOLOGY TYPES AND PROCESS OPTIONS FOR BUILDINGS

General Response Actions	Remedial Technology Types	Process Options
- No Action	- No Action	None.
- Limited Action	- Institutional Controls	Inform local officials, hold public meetings, use restrictions (*e.g.*, markings).
- Containment	- Encapsulation	Surface sealing.
- Removal/Treatment/Disposal	Removal Technologies	
	- Demolition	Complete or partial demolition.
	Treatment Technologies	
	- Decontamination (pre- or post-demolition)	Vacuuming and washing, sealing.
	Disposal Technologies	
	- Disposal	On-site re-use, on-site landfill, off-site disposal.

400201

TABLE 2-7 (Sheet 1 of 5)

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
1. No Action	• No Action	No action taken.	Yes	Provides baseline against which other remedial technologies can be compared. Required for consideration by CERCLA as amended.
2. Limited Action	•Soil monitoring	Samples are collected and analyzed for contaminants and exposure to contaminants is assessed.	Yes	Contaminant levels and exposure pathways are assessed. A necessary component of alternatives that leave contamination on-site.
	• Inform local officials and hold public meetings	Public awareness programs are conducted.	Yes	Reduces likelihood of exposure to soil through public awareness program.
	• Institutional Controls	Negotiations are held with property owner to file a notice or similar legal document that advises of contamination and prohibits unrestricted use of property.	Yes	Reduces likelihood of exposure to contaminated soil. Property owner may not readily agree.
	• Engineering Controls	Access restrictions (fencing, signage, etc.) are implemented.	Yes	Reduces likelihood of exposure to soil through engineering controls.
3. Containment	• Soil Cap	Installed over contaminated soil to prevent direct contact with contaminants.	Yes	Susceptible to erosion, settling, and ponding of liquids, and burrowing animals. Maintenance is required.
	• Clay Cap	Physically isolates the contamination source and may reduce the potential leaching of contaminants.	Yes	Low permeability bentonite layer is effective for reducing exposure to impacted material; susceptible to erosion, cracking, and burrowing animals. Maintenance is required.
	• Asphalt Cap	Prevents direct contact with contaminants and has low permeability.	Yes	Low susceptibility to erosion and highly effective in preventing direct contact and exposure to impacted materials. Maintenance is required.
	• Multi-layer Cap	A combination of the above capping options to prevent contact and/or isolate the contaminant source.	Yes	Combination of different capping options allows for the maximization of effective options. Maintenance is required.
4. Removal	• Excavation	Complete or partial physical removal of contaminated soil with the intention of subsequent treatment and/or disposal.	Yes	Services, materials, and equipment are well developed and readily available.

400202

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
5. Treatment	● Physical Treatment			
	• Reuse/Recycling	Impacted material is used as part of a process in manufacturing a useful and saleable product, such as cement clinker, bricks, or asphalt.	Yes	May be difficult to find appropriate facilities due to hauling distances, media volume, material restrictions, sampling requirements, and costs. May not be able to reuse metals or PCB contaminated soils.
	• Solidification/ Stabilization	Contaminated soils are converted into a stable cement-type matrix so that contaminants are bound and become immobile.	Yes	Although the technology is proven and commonplace, bench testing is required to identify the site-specific appropriate (cementitious) additives and dosage rates.
	• Soil Washing	Processing impacted material in a treatment unit for removal of organic constituents.	No	Significant feedstock preparation is necessary and large volumes of aqueous waste are generated and would require further treatment. Limited effectiveness for low solubility contaminants.
	● Chemical Treatment			
	• Lime Neutralization	Lime addition neutralizes acids in the soil.	No	Only treats a very small portion of site contaminants; some difficulty in maintaining the correct pH.
	• Chemical Oxidation	An oxidizing agent, such as hydrogen peroxide, reacts with the soil and breaks down the organic constituents into carbon dioxide and water.	No	PCBs are resistant to oxidation. Dioxins are not readily oxidized.
	• Chemical Dehalogenation	Reagents are added to soils with halogenated organics. The dehalogenation process is achieved by either the replacement of the halogen molecules or the decomposition and partial volatilization of the contaminants.	Yes	Target contaminant groups are halogenated SVOCs and pesticides. Depending on which reagent is used, PCBs can be treated. Process design must assure sufficient contact. Process is less effective against halogenated VOCs.

400203

TABLE 2-7 (Sheet 3 of 5)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
5. Treatment (Cont'd)	• Chemical Extraction	Contaminated soil and extractant are mixed in an extractor, thereby dissolving the contaminants. The extracted solution is then placed in a separator, where the contaminants and extractant are separated for treatment and further use.	Yes	Process design must assure sufficient contact. Organically bound metals can be extracted along with target organic pollutants.
	● Biological Treatment			
	• Aerobic Biodegradation	Microbes or selectively adapted bacteria, nutrients, oxygen, and water are used to degrade organic compounds in soil.	No	Not applicable for the removal of PCBs and metals.
	• Anaerobic Biodegradation	Microbes or selectively adapted bacteria and nutrients are used to degrade organic compounds in the absence of oxygen.	No	Not applicable for the removal of metals. Not well demonstrated in field for removal of PCBs. May take an extended period of time for cleanup.
	• Phytoremediation	Process that uses plants to remove, transfer, stabilize, and destroy contaminants in soil. The mechanisms of phytoremediation include enhanced rhizosphere biodegradation, phytoextraction, phyto-degradation, and phyto-stabilization.	No	Not effective for PCBs. It can transfer contamination across media, *e.g.*, from soil to air. Not effective at depth.
	● Thermal Treatment			
	• Thermal Desorption	A thermal stripping process in which direct or indirect heating methods volatilize organics from the soil.	Yes	PCBs and organics are thermally separated from soil. Metals remain in the impacted material and require further treatment or disposal.
	• Incineration	Organic contaminants in soil are thermally destroyed at very high temperatures.	Yes	Effective technology for destruction of organic contaminants at the facility.
	• Pyrolysis	Cracking and decomposition of organic constituents by heating in the absence of oxygen.	No	Not feasible for streams with high concentrations of metals or inorganics. Not a conventional full-scale technology.

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
5. Treatment (Cont'd)	• *In Situ* Treatment			
	• *In Situ* Biodegradation	Microbes and oxygen are injected into subsurface soil to degrade organic compounds.	No	Not feasible for the removal of metals. Technology is not sufficiently advanced to assure removal of PCBs.
	• *In Situ* Oxidation	A chemical reagent is injected into the soil to break down organic constituents into carbon dioxide and water.	No	PCBs are resistant to oxidation. Dioxins are not readily oxidized. Not feasible for the removal of PCBs and inorganics.
	• *In Situ* Solidification/ Stabilization	Contaminated soils are converted in-place into a stable matrix, making the contaminants immobile. Stabilizing agents (silicates) are injected and mixed with the soil.	Yes	Appropriate for and effective in immobilizing site contaminants and preventing exposure; disposal is not needed. Field testing is required to identify the site-specific appropriate (cementitious) additives and dosage rates.
	• *In Situ* Soil Washing	A surfactant is injected into the impacted material. The sorbed contaminants are mobilized into solution and extracted via subsurface wells.	No	Ability of the washing agent is negatively impacted by the subsurface soil heterogeneity; further treatment needed for the extracted aqueous (reagent) waste. Limited effectiveness for low solubility contaminants. Control is difficult.
	• *In Situ* Hot Air/Steam Injection	Hot air or steam is injected below the contaminated zone to heat up contaminated soil. The heating enhances the release of contaminants from the soil matrix. Some VOCs and SVOCs are stripped from the contaminated zone and brought to the surface through soil vapor extraction.	No	Soil that is fine grained and well compacted has high moisture content has a reduced permeability to air, hindering operation and requiring more energy input to increase vacuum and temperature. High organic content has a high sorption capacity of VOCs, which results in reduced removal rates. PCBs will resist volatilization. Heterogeneity will inhibit thermal contact.
	• *In Situ* Soil Vapor Extraction	Vacuum is applied through extraction wells to create a pressure/concentration gradient that induces gas-phase volatiles to be removed from soil through extraction wells.	Yes	Removes gas-phase volatiles, but will not remove metals, dioxins, or PCBs. Non-volatile contaminants not treated. May be effective for high concentrations of VOCs at site. Increased potential for biodegradation.

400205

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
5. Treatment (Cont'd)	• *In Situ* Vitrification	A solidification method that employs heat (1600°C to 2000°C) to melt and convert waste materials into glass. The high temperatures destroy organic constituents with few by-products.	No	Requires large power requirements. Typically only used for radiological encapsulation.
	● Vapor Phase Emission Control			
	• Vapor Phase Carbon Adsorption	Treats vapor phase emissions by transferring and concentrating volatile organics (the adsorbate) from one medium (vapor/gas) to another (adsorbent).	Yes	Well established technology. Decreases contaminant mobility and volume while increasing contaminant concentration in adsorbent.
	• Incineration (afterburner)	Thermally destructive method employed to destroy hazardous wastes, particularly chlorinated hydrocarbons, PCBs, and dioxins.	Yes	External energy sources are usually required. May not be cost effective if treated off-site.
	• Catalytic Oxidation	Destructive technology in which vapor phase contaminants are oxidized in the presence of a catalyst.	Yes	Used as a final vapor phase treatment for organic vapors generated during different treatment processes. External energy source is generally required.
6. Disposal	• On-site Reuse	Impacted soil is excavated, treated (if necessary), and reused as backfill on-site in the excavated areas.	Yes	Material to be reused must meet geotechnical requirements and regulatory standards.
	• On-site Landfill	Impacted soil is excavated and then disposed in a landfill which is constructed on-site, including a liner system, leachate collection and treatment system, and a multi-layer cap.	Yes	The on-site landfill must meet rigorous regulatory requirements. Requires highly detailed engineering controls.
	• Off-site Disposal	Hazardous impacted material is transported to a regulated facility for treatment prior to disposal (landfill).	Yes	Although there are associated high costs for disposal and limited landfill capacity, it is still a viable option.

TABLE 2-8
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
INITIAL SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR BUILDINGS

General Response Actions	Remedial Technology Categories and Process Options	Description	Technically Feasible	Screening Comments
1. No Action	• No Action	No action taken.	Yes	Provides baseline against which other remedial technologies can be compared. Required for consideration by CERCLA as amended.
2. Limited Action	• Public Awareness	Inform local officials and hold public meetings	Yes	Reduces likelihood of exposure through public awareness program.
	• Institutional Controls	Intermittent site reviews and implementation of an Environmental Health & Safety (EHS) Plan. Specifies allowable activities.	Yes	Reduces likelihood of exposure and inhalation of building dust.
3. Containment	• Containment	Encapsulation and/or sealing of contaminants.	Yes	Allows for continued building use. Mitigates exposure.
4. Removal	• Demolition	Complete or partial tearing down of contaminated buildings.	Yes	The technology can be expensive; large amounts of debris generated requiring disposal.
5. Treatment	• Decontamination	Treating and removing building contamination via vacuuming and washing impacted buildings.	Yes	Readily implementable; the aqueous wash waste requires further treatment. Pilot testing required to evaluate site-specific requirements.
6. Disposal	• On-site Reuse	Hazardous impacted material is disposed on-site and capped.	Yes	If decontaminated adequately, can be used as fill with adequate engineering controls. There are potentially stringent regulatory issues to address.
	• On-site Landfill	Impacted material is handled and then disposed in a landfill which is constructed on-site, including a liner system, leachate collection and treatment system, and a multi-layer cap.	Yes	The on-site landfill must meet rigorous regulatory requirements. Requires highly detailed engineering controls.
	• Off-site Disposal	Hazardous impacted material is transported to a regulated facility, treated, and properly disposed. Non-hazardous material is disposed off-site in a non-hazardous landfill.	Yes	Although there are associated high costs for disposal and limited landfill capacity, it is still a viable option.

400208

TABLE 2-9 (Sheet 1 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
1. No Action	• No Action *	Does not meet RAOs.	Easily implemented	Very low cost
2. Limited Action	• Monitor and analyze soils *	Prevents exposure to site contaminants, protects workers during future activities, and monitors site conditions.	Easily implemented	Low cost
	• Inform local officials and hold public meetings *	Prevents exposure to site contaminants, protects workers during future activities, and monitors site conditions.	Easily implemented	Low cost
	• Institutional Controls *	Prevents exposure to site contaminants, protects workers during future activities, and monitors site conditions.	Easily implemented	Moderate cost
	• Engineering Controls *	Prevents exposure to site contaminants, protects workers during future activities, and monitors site conditions.	Easily implemented	Moderate cost
3. Containment	• Soil Cap *	Prevents exposure to site contaminants.	Easily implemented	Low cost
	• Clay Cap	Prevents exposure to site contaminants; reduced infiltration.	Easily implemented	Moderate cost
	• Asphalt Cap *	Prevents exposure to site contaminants.	Easily implemented	Moderate cost
	• Multi-layer Cap*	Prevents exposure to site contaminants, minimizes infiltration.	Moderately difficult to implement	High cost
4. Removal	• Excavation *	Effective for contaminant removal; subsequent treatment needed.	Easily implemented at shallow depths; more complex for deeper contamination	Low to high cost, depending on required depth
5. Treatment	● Physical • Reuse/recycling	Not effective for soils contaminated with metals and PCBs.	Easily to moderately difficult to implement, depending on the options and available facilities	Moderate cost

TABLE 2-9 (Sheet 2 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
5. Treatment (Cont'd)	• Solidification/Stabilization	Moderately effective for immobilizing site contaminants; no destruction of site contaminants.	Easily implemented; must identify disposal location for stabilized contaminants	Moderate cost
	● Chemical			
	• Chemical Dehalogenation	The target contaminant groups are halogenated SVOCs and pesticides. Successfully field tested to treat PCBs. May require large volumes of reagent for treatment.	Difficult to implement	High cost
	• Chemical Extraction	Has been shown to be effective in treating organic contaminants such as PCBs, VOCs, halogenated solvents, and petroleum wastes.	Difficult to implement	High cost
	● Thermal			
	• Thermal Desorption*	Effective for removal of site organic contaminants, not effective for metals.	Moderately difficult to implement	Moderate cost
	• Incineration	Effective for destruction of site contaminants, not effective for metals.	Difficult to implement	Very high cost
	● *In Situ* Treatment			
	• *In Situ* Solidification/ Stabilization *	Effective for immobilizing site contaminants; no destruction of site contaminants.	Moderately difficult to implement; no need for disposal	Moderate cost
	• *In Situ* Soil Vapor Extraction*	The target contaminant groups are VOCs and some fuels. Will not remove heavy oils, metals, PCBs, or dioxins.	Moderately difficult to implement	Moderate cost

TABLE 2-9 (Sheet 3 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR SOILS

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
	● Vapor Phase Emission Control • Vapor Phase Carbon Adsorption	Not recommended to remove high contaminant concentrations from effluent air streams. Spent carbon must be disposed of and the adsorbed contaminants must be destroyed.	Easily implemented	Moderate cost
	• Incineration (afterburner)	Effective for hazardous wastes, particularly chlorinated hydrocarbons, PCBs, and dioxins.	Difficult to implement	Very high cost
	• Catalytic Oxidation	Used to treat VOCs. Most commercially available catalysts are proprietary.	Moderately difficult to implement	High cost
6. Disposal	• On-site Reuse	Effective only for disposal of un-contaminated material. Not applicable for contaminated media.	Easily implemented.	Low cost
	• On-site Landfill	Effective, as potentially contaminated material remains on-site, but in an engineered landfill.	Difficult to implement due to regulatory issues and site conditions	Moderate cost
	• Off-site Disposal*	Effective for final disposal.	Easy to moderately difficult to implement due to potentially large volumes implemented; requires transportation coordination	Moderate to high cost

* Technologies and process options carried forward for alternative development.

TABLE 2-10
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
EVALUATION OF PROCESS OPTIONS FOR BUILDINGS

General Response Actions	Remedial Technology Categories and Process Options	Effectiveness	Implementability	Cost
1. No Action	• No Action *	Does not meet RAOs.	Easily implemented	Very low cost
2. Limited Action	• Public Awareness	Prevents exposure to site contaminants, protects workers during future activities.	Easily implemented	Low to moderate cost
	• Institutional Controls *	Prevents exposure to site contaminants, protects workers during future activities, and monitors interior building conditions.	Easily implemented	Moderate cost
3. Containment	• Containment *	Prevents exposure to site contaminants.	Moderately difficult to implement	Moderate to high cost
4. Removal	• Demolition *	Effective for contaminant removal for subsequent treatment and disposal.	Moderately difficult to implement	Moderate cost
5. Treatment	• Decontamination via Vacuuming and Washing *	Moderate to high effectiveness for removal of building contamination.	Easily implemented	Moderate cost
6. Disposal	• On-site Reuse	Effective only for disposal of uncontaminated debris.	Easily implemented	Low cost
	• On-site Landfill	Effective as potentially contaminated material remains on-site, but in an engineered landfill.	Difficult to implement due to regulatory issues and site conditions	Moderate cost
	• Off-site Disposal *	Effective for final disposal.	Easy to moderately difficult to implement due to potentially large volumes; requires transportation coordination	Moderate to high cost

* Technologies and process options carried forward for alternative development.

400211

SECTION 3.0

3.0 DEVELOPMENT AND INITIAL SCREENING OF REMEDIAL ALTERNATIVES

In this section, the representative process options selected in Section 2.4.2 for alternative development are combined into potential remedial alternatives. If necessary, due to development of a large number of alternatives, these potential remedial alternatives would be screened based on effectiveness, implementability, and cost considerations to reduce the number of alternatives for detailed analysis. However, based on the limited number of alternatives developed, the initial screening of alternatives to reduce the number of alternatives for detailed analysis was not required. All of the developed alternatives were retained for detailed analysis, presented in Section 4.0.

3.1 Development of Remedial Alternatives

Soil (S) and building (B) remedial alternatives were developed based on the screening of technologies and process options in Section 2.0 as follows:

Soil Remedial Alternatives

- S-1: No Action
- S-2: Excavation/Off-Site Disposal/Institutional Controls
- S-3: "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/Institutional Controls
- S-4: Soil Vapor Extraction/Solidification/Multi-Layer Cap/Institutional Controls
- S-5: Low Temperature Thermal Desorption/Multi-Layer Cap/Institutional Controls

Building Remedial Alternatives

- B-1: No Action
- B-2: Decontamination and Surface Encapsulation/Institutional Controls
- B-3: Demolition/Off-Site Disposal

SECTION 4.0

4.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents the detailed analysis of the remedial alternatives developed in Section 3.0 with respect to the requirements set forth in CERCLA. The following EPA documents were used during this analysis: *"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA"* (EPA, 1988a), and *"Revised Handbook for Remedial Action at Waste Disposal Sites"* (EPA, 1985). Section 4.1 discusses the evaluation process and the criteria against which the remedial alternatives were evaluated. Sections 4.2 and 4.3 present a detailed description of the alternatives and the evaluation of each alternative with respect to the evaluation criteria for facility soils and buildings, respectively. Sections 4.4 and 4.5 summarize the comparative analysis of remedial alternatives for facility soils and buildings, respectively.

4.1 Evaluation Process

The detailed analysis of remedial alternatives included the following steps:

- The first step was to define each alternative with respect to the volumes and/or areas of contaminated media to be addressed, the remedial technologies to be used, and any performance requirements associated with those technologies;

- In the next step, each alternative was evaluated against seven of the nine evaluation criteria (see below) as defined by the EPA RI/FS Guidance Document (EPA, 1988a); and

- Finally, a comparative analysis of the remedial alternatives to assess the relative performance of each alternative with respect to each evaluation criterion was performed.

The following statutory preferences were considered during the alternative analysis:

- Protection of human health and the environment (CERCLA Section 121 (b));

- Attainment of ARARs of federal and state laws (CERCLA Section 121(d)(2)(A)) to the maximum extent practicable, or waiver of ARARs (CERCLA Section 121(d)(4));

- Provision of a cost-effective solution, taking into consideration short- and long-term costs (CERCLA Section 121(a));

- Use of permanent solutions and treatment technologies or resource recovery technologies to the maximum extent practicable (CERCLA Section 121(b)); and

- Satisfaction of the preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as a principal element, or explanation of reasons why such remedies were not selected (CERCLA Section 121(b)).

In order to address the CERCLA requirements, EPA developed nine criteria for the evaluation of alternatives. These criteria are defined in the EPA RI/FS Guidance Document (EPA, 1988a), and summarized below.

The first two criteria are the "threshold" factors. Any alternative that does not satisfy both of these criteria is eliminated from further consideration in the detailed analysis, with the exception of the No Action alternative, which is required by CERCLA to be carried through the entire evaluation process. The two threshold criteria are:

- Overall protection of human health and the environment; and
- Compliance with ARARs.

Five "primary balancing" criteria are used to make comparisons and to identify the major tradeoffs between the remedial alternatives. Alternatives that satisfy the threshold criteria are evaluated further using the following primary balancing criteria:

- Long-term effectiveness;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability; and
- Cost.

The remaining two criteria are "modifying" factors that are not addressed in this Feasibility Study Report, but are incorporated into the remedy selection process prior to issuance of the ROD. These two criteria are:

- State acceptance; and
- Community acceptance.

A discussion of the first seven evaluation criteria is presented below.

Overall Protection of Human Health and the Environment

This evaluation criterion provides an overall assessment of protection based on a composite of long-term and short-term effectiveness factors. Evaluation of overall protection addresses:

- How well a specific site remedial action achieves protection over time;
- How well site risks are reduced; and
- How each source of contamination is to be eliminated, reduced, or controlled for each remedial alternative.

400216

Compliance with ARARs

This evaluation criterion is used to determine how each remedial alternative complies with applicable or relevant and appropriate federal environmental laws and state environmental or facility siting laws as defined in CERCLA Section 121. Each alternative is evaluated in detail for:

- Compliance with chemical-specific ARARs (*e.g.*, RCRA Standards);
- Compliance with action-specific ARARs (*e.g.*, RCRA minimum technology standards);
- Compliance with location-specific ARARs (*e.g.*, preservation of historic sites); and
- Compliance with appropriate criteria, advisories, and guidances (*i.e.*, TBC material).

Section 2.0 presented the ARARs used to evaluate the proposed remedial alternatives.

Long-Term Effectiveness

This evaluation criterion addresses the results of the remedial action in terms of the risk remaining at the site after the response objectives have been met. The components of this criterion include the magnitude of the remaining risks measured by numerical standards such as cancer risk levels; the adequacy and suitability of controls used to manage treatment residuals or untreated soils; and the long-term reliability of management controls for providing continued protection from residuals (*i.e.*, the assessment of potential failure of the technical components).

Reduction of Toxicity, Mobility, or Volume Through Treatment

This evaluation criterion addresses the statutory preference for treatment that results in the reduction of the total mass of toxic contaminants, the irreversible reduction in contaminant mobility, or the reduction of the total volume of contaminated media. Factors to be evaluated in this criterion include the treatment process employed; the amount of hazardous material destroyed or treated; the degree of reduction in toxicity, mobility, or volume expected; and the type and quantity of treatment residuals.

Short-Term Effectiveness

This evaluation criterion addresses the impacts of the remedial action during the construction and implementation phases preceding the attainment of the remedial response objectives. Factors to be evaluated include protection of workers and neighboring communities during the remedial actions, environmental impacts resulting from the implementation of the remedial actions, and the time required to achieve protection.

Implementability

This criterion addresses the technical and administrative feasibility of implementing a remedial action and the availability of services and materials required during its implementation. Technical feasibility factors include construction and operation difficulties, reliability of technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy. The administrative feasibility includes the ability and time required for administrative approvals and to coordinate with other agencies. Factors employed in evaluating the availability of services and materials include availability of treatment, storage, and disposal services with required capacities; availability of equipment and specialists; and availability of prospective technologies for competitive bidding.

Cost

This criterion addresses capital costs, O&M costs, and potential future remedial action costs. Capital costs consist of direct and indirect costs. Direct costs include expenditures for the equipment, labor, and materials necessary to install remedial actions. Indirect costs include expenditures for engineering, financial, and other services required to complete the installation of remedial alternatives.

Annual O&M costs include labor for the operation of the systems as well as maintenance, auxiliary materials and energy, disposal of residues, purchased services, administrative costs, insurance, taxes, license costs, maintenance reserve and contingency funds, and rehabilitation costs. It is assumed that the O&M costs are incurred after the remedial activities are completed.

The cost assessment evaluates the costs of the remedial actions on the basis of present worth. Present worth analysis allows remedial alternatives to be compared on the basis of a single cost representing an amount that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial alternative over its planned lifetime. A required operating performance period and a discount rate, or a net rate of return on investment, are assumed for calculation of present worth, which is a function of the discount rate and time. For this FS, a discount rate of one percent and a performance period of 30 years was assumed for a base calculation. The "study estimate" costs provided for the remedial actions are intended to reflect actual costs with an accuracy of approximately -30 to +50 percent.

4.2 Alternative Analysis for Facility Soils

4.2.1 Alternative S-1: No Action

4.2.1.1 Description

In this alternative, no remedial activities or monitoring would be performed. This alternative does not include the implementation of institutional controls. The No Action alternative provides the baseline case for comparison with other remediation alternatives for soils. As required by CERCLA, regular five-year reviews would be performed to assess the need for additional remedial actions in the future.

4.2.1.2 Assessment

Overall Protection of Human Health and the Environment

The No Action alternative would entail no monitoring, removal, or treatment of the soil contaminants. The contaminated soil would be left in place. The volume of contaminated soil and the exposure risks would be expected to remain the same. The site stabilization measures that were previously implemented at the facility would remain. However, under this alternative, there would be no maintenance of these measures. There is an ongoing potential for exposure to contaminated soils. The No Action alternative would not be protective of human health and the environment.

Compliance with ARARs

The No Action alternative does not satisfy action-specific ARARs and no location-specific ARARs would be triggered by the No Action alternative. There are no chemical-specific ARARs for contaminated soils. EPA's August 1990 guidance entitled *A Guide on Remedial Actions at Superfund Sites with PCB Contamination* recommends a cleanup goal of 1 ppm for unrestricted land use and a range between 10-25 ppm for commercial/industrial properties. The State of New Jersey has developed State-wide residential direct contact soil cleanup criteria (RDCSCC) for PCBs of 0.49 ppm and non-residential direct contact soil cleanup criteria for PCBs of 2 ppm for commercial/industrial properties, which are "To Be Considered" criteria. In addition, New Jersey has developed impact-to-groundwater criteria for various contaminants (also "To Be Considered" criteria).

EPA has promulgated requirements for the management of PCB wastes as directed by the Toxic Substances Control Act, and these requirements would be applicable to the management of PCB contamination at the site. These requirements provide a risk-based approach for managing PCB wastes.

Long-Term Effectiveness

The No Action alternative provides no reduction in risk. Long-term risks associated with the No Action alternative are related to the potential baseline human health risks. These risks would still exist through the potential soil exposure pathways (*i.e.*, ingestion, absorption, and inhalation).

As required by CERCLA, review and evaluation of site conditions would be performed every five years. If justified by the review, additional remedial actions could be required. This alternative would not be effective over the long-term because contaminated soils would remain in place. The risks posed by contaminated media would not be mitigated.

Reduction of Toxicity, Mobility, or Volume Through Treatment

This alternative would not involve any removal, treatment, or disposal of the contaminants in the soils and as such, no reduction in toxicity, mobility, or volume through treatment would result.

Short-Term Effectiveness

The No Action alternative for soils does not include any remedial activities. Since this alternative does not involve construction activities, there are no threats to workers or the community during implementation.

Implementability

Technical Feasibility

The technical feasibility of this alternative would be very high, since no remedial activities or monitoring would be performed.

Administrative Feasibility

This alternative would require administrative coordination for performance of site reviews every five years. Coordination with state and local authorities might be required in the future for making appropriate decisions with regard to additional remedial activities.

Availability of Services and Materials

No services or material would be required for this alternative.

Cost

There would be no capital or O&M costs associated with this alternative.

4.2.2 Alternative S-2: Excavation/Off-Site Disposal/Institutional Controls

4.2.2.1 Description

This alternative consists of the excavation of the contaminated soils that exceed New Jersey Department of Environmental Protection's Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for all contaminants except PCBs and excavation of soils containing PCBs at concentrations greater than 10 ppm. This excavation encompasses the capacitor disposal areas (see Figure 4-5). Figure 4-1 shows the impacted areas that exceed IGWSCC for all constituents except PCBs, and soils containing PCBs at concentrations greater than 10 ppm. The total impacted area is approximately 18.1 acres. Based on the data collected to date, the remaining portion of the property would not need to be excavated to meet the specified cleanup criteria. However, additional data collected during the remedial design/remedial action may result in the need for additional excavation.

In this alternative, the impacted soils would be excavated to the required depths (approximately 2 to 14 feet) to meet the cleanup criteria. An estimated 272,000 in-place cubic yards of soil would be excavated and transported off-site for proper disposal. Excavated soils would be characterized for treatment (if necessary) and off-site disposal in accordance with applicable regulations. Post excavation sampling would be performed to confirm that the cleanup levels have been achieved. Any exceedances of the cleanup criteria detected during the post-excavation confirmatory sampling would result in additional excavation, treatment (if necessary), and disposal. Therefore, the quantity of soil excavated under this remedial alternative could increase during the remedial action.

Upon completion of the excavation work, the excavations would be backfilled with certified clean fill and/or uncontaminated soils that were excavated to reach contaminated soils at depth. The property would be restored to approximately the original grade before remediation. The surface would be paved and/or covered with clean fill and vegetated, based on planned future uses within each portion of the property. Engineering controls would be placed over all areas where PCB concentrations above 2 ppm remain. Institutional controls would be employed to ensure that any future activities were performed with knowledge of site conditions and appropriate health and safety controls, and to prohibit future unrestricted use of the property.

4.2.2.2 Assessment

Overall Protection of Human Health and the Environment

The excavation and off-site disposal of contaminated soil from the facility would minimize the potential human health and ecological risks associated with exposure to contaminated soils. Engineering controls and institutional controls (*e.g.*, a deed notice) would further mitigate the potential for exposure to residual contamination. This alternative would result in overall protection of human health and the environment.

Compliance with ARARs

This alternative would be completed in compliance with action- and location-specific ARARs. This alternative would require the implementation of measures to protect wetlands and endangered species, in accordance with federal and state ARARs, such as the "Protection of Wetlands Executive Order," "Wetlands Protection at Superfund Sites," the "Wetlands Act of 1970," the "Freshwater Wetlands Protection Act Rules," the "Endangered Species Act," etc. The substantive requirements of the federal and state waste management regulations regarding capping of wastes would also be met.

Subsurface areas in the undeveloped portion of the site may contain former land surfaces and associated cultural resources that relate to pre-historic and/or early historic time periods. Therefore, the proposed remedial alternative for soils may expose or disturb archeological cultural resources that may be eligible to the National Register of Historical Places (NRHP). If subsurface archeological sites are discovered within the facility property and determined to be eligible to the NRHP under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. An MOA will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

There are no chemical-specific ARARs for contaminated soils.

Long-Term Effectiveness

Under Alternative S-2, long-term risks would be greatly reduced, since contaminated soils would be permanently removed through the excavation and off-site disposal. Off-site treatment/disposal of the contaminated soil at a secure, permitted hazardous waste facility is reliable because the design of such facilities includes safeguards intended to ensure the reliability of the technology and the security of the waste material. Excavated soil would be replaced by clean materials. The property would have residual risks that are acceptable for non-residential use for all of the COPCs, except for PCBs. Residual risk associated with PCBs above 2 ppm would be mitigated via engineering and institutional controls such as a deed notice.

Reduction of Toxicity, Mobility, or Volume

This alternative would result in a significant reduction of toxicity, mobility, and volume of contamination at the property through removal and off-site disposal of soils. If necessary to meet off-site disposal requirements, the materials would be treated at the off-site facility prior to disposal, reducing the toxicity and volume of the contaminated soils.

Short-Term Effectiveness

The potential public health threats to workers and area residents during excavation and soil handling would include direct contact with contaminated soils and inhalation of fugitive dust. The area would be secured and access would be restricted to authorized personnel only. Standard dust control measures such as wind screens and water sprays would be used, as necessary, to minimize fugitive dust emission resulting from excavation and soil handling. Air monitoring, both in the work zone and at the perimeter of the property, would be conducted throughout the remediation activities to ensure the nearby community is not exposed to site-related contamination.

The health and safety program would address the measures for protection against the principal threat hazards. The risk to workers would be minimized by the use of standard health and safety practices such as enclosed cabs on excavation equipment and proper personal protective equipment (PPE) to prevent direct contact with contaminated soil and inhalation of fugitive dust.

Short-term impacts on the environment resulting from removal of vegetation and destruction of habitat in the soil would be minimal since the area has minimal vegetation and wildlife. Impacts would be temporary and would be mitigated by restoring the remediated area. Erosion control measures, such as silt fencing, would be provided during excavation activities to control migration of contaminated soil. Short-term impacts to the environment would also include increased traffic and noise resulting from hauling soil off-site and clean fill on-site. Coordination with local authorities would be necessary to minimize impacts on local traffic patterns. Construction activities would be performed in accordance with any local noise ordinances to minimize impacts to the community.

A total period of one to two years is estimated for this remedial alternative for planning, design, and procurement. Construction work associated with this alternative is expected to take an additional two years.

Implementability

Technical Feasibility

All the components of this remedial alternative are well developed and commercially available. The large volumes of excavated soil designated for off-site disposal may require identification of multiple disposal and possible treatment facilities. If perched water is encountered during excavation of soils, dewatering may be required. This alternative would be more difficult to implement if the buildings were not removed. Excavation near and between buildings may require the use of shoring and specialized equipment, and it may not be possible to achieve the cleanup objective. Sufficient area is available on the facility for staging wastes.

Administrative Feasibility

Implementation of this alternative would require restricting access to the facility during the remediation process. Since contamination would remain, engineering and institutional controls would be required upon completion of the remedial activities. These restrictions would require negotiation with and the cooperation of the property owners.

Availability of Services and Materials

Excavation and placement of fill materials can be performed with common construction equipment and should not pose any implementation problems. Long-term maintenance of the engineering controls would also be necessary; these services are also readily available.

Cost

The total capital cost for this alternative is estimated to be $111,000,000. O&M costs associated with this alternative for maintenance of the 21.1 acre engineering control would be approximately $124,000 per year. The present worth, calculated at a discount rate of 1 percent over a 30 year period would be approximately $114,000,000. This cost could change substantially during remedial activities if any action level exceedances are detected during post-excavation sampling.

4.2.3 Alternative S-3: "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/Institutional Controls

4.2.3.1 Description

This alternative consists of the excavation of the contaminated soils considered to pose a "principal threat" at the property, including soils that exceed NJDEP IGWSCC for all contaminants except PCBs, soils containing PCBs at concentrations greater than 500 ppm and the capacitor disposal areas. Contaminated soils containing less than 500 ppm but greater than 10 ppm PCBs will be capped with a multi-layer cap to minimize contaminant migration. In addition, engineering controls would be placed over areas of the property outside the limits of the multi-layer cap with soil containing PCBs above 2 ppm. Institutional controls would be employed to ensure that any further activities were performed

400223

with knowledge of site conditions and appropriate health and safety controls, and to prohibit future unrestricted use of the property.

Figure 4-2 shows the areas that exceed IGWSCC and soils with PCBs greater than 500 ppm. This excavation is approximately 107,000 in-place cubic yards. Excavated soils would be managed as described in Alternative S-2. Post excavation sampling would be performed to confirm that the cleanup levels have been achieved. Any exceedances of the cleanup criteria detected during the post-excavation confirmatory sampling would result in additional excavation, treatment (if necessary), and disposal. Therefore, the quantity of soil excavated under this remedial alternative could increase during the remedial action.

Figure 4-2 also shows the areas that have soils with PCBs greater than 10 ppm but less than 500 ppm. This area, as well as the excavated area, will be capped with a multi-layer cap. The total area to be capped is approximately 19.4 acres.

A multi-layer cap system is a combination of two or more single layer capping technologies. Figure 4-3 shows a typical cross-section for a multi-layer cap system; other designs are possible that achieve the same goals. The system in Figure 4-3 shows a six-inch topsoil layer placed over a one-foot layer of clean fill, which overlays a drainage layer. A non-woven geotextile layer is placed between the clean fill and the drainage layer. This then overlays the HDPE layer, which overlays the contaminated soil. Additionally, any "hardscape" surfaces (*e.g.*, building foundations, concrete walkways, asphalt parking areas) could be used in conjunction with the multi-layer cap. However, this would require implementation of a vapor mitigation system for the on-site buildings if such additional measures are determined to be necessary.

4.2.3.2 Assessment

Overall Protection of Human Health and the Environment

The excavation and off-site disposal of the "principal threat" contaminants from the property would mitigate the potential human health and ecological risks associated with exposure to contaminated soils. Capping of remaining contaminated soil by a multi-layer cap would provide protection of human health and the environment by reducing the soil exposure pathways for human and ecological receptors, water infiltration, and minimizing migration of contaminants. The protection would exist only as long as the cap was actively maintained, since contaminants would remain and a breach of the cap could re-establish human and/or ecological exposure routes. Engineering and institutional controls would further reduce residual risks not addressed by excavation or the multi-layer cap.

Compliance with ARARs

All activities for this alternative would be performed in accordance with location- and action-specific ARARs. Measures would be taken to protect wetlands and endangered species, in accordance with federal and state ARARs, such as the "Protection of Wetlands Executive Order," "Wetlands Protection at Superfund Sites," the "Wetlands Act of 1970," the "Freshwater Wetlands Protection Act Rules," the "Endangered Species Act," etc. The substantive requirements of federal and state waste management regulations regarding capping of wastes would be met.

400224

Subsurface areas in the undeveloped portion of the site may contain former land surfaces and associated cultural resources that relate to pre-historic and/or early historic time periods. Therefore, the proposed remedial alternative for soils may expose or disturb archeological cultural resources that may be eligible to the NRHP. If subsurface archeological sites are discovered within the facility property and determined to be eligible to the NRHP under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. An MOA will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

There are no chemical-specific ARARs for contaminated soils.

Long-Term Effectiveness

This alternative would reduce long-term risks, since highly contaminated soils (principal threat wastes) would be removed. Off-site treatment/disposal of the contaminated soil at a secure, permitted hazardous waste facility is reliable because the design of such facilities includes safeguards intended to ensure the reliability of the technology and the security of the waste material. Like Alternative S-2, Alternative S-3 relies on institutional controls to reduce future health risks to property owners/occupants associated with the exposure to contaminated soils.

The capping of the remaining contaminated soil (greater than 10 ppm PCBs) would minimize the human health and ecological exposure risks as long as the capped areas were maintained and future activities did not disturb the capped areas, thereby re-establishing exposure routes. Although the cap would minimize infiltration, since the contamination would be left in place, the potential would still exist for migration of contaminants into groundwater and/or surface water and the establishment of new exposure routes. Additional engineering controls in areas with PCBs greater than 2 ppm would mitigate residual exposure risks. Long-term monitoring and institutional controls would be required for this alternative.

The excavation and off-site disposal of contaminated soil in conjunction with the cap would reduce the potential human health and ecological risks associated with exposure to contaminated soils. Excavated soil would be replaced by clean materials.

Reduction of Toxicity, Mobility, or Volume

This alternative would result in a reduction of toxicity, mobility, and volume through removal and off-site disposal of contaminated soil. If necessary to meet off-site disposal requirements, the materials would be treated at the off-site facility prior to disposal, reducing the toxicity and volume of contaminated soils.

Residual contamination capped with the multi-layer cap would also become less mobile as the cap would minimize infiltration and erosion as long as it was adequately maintained.

Short-Term Effectiveness

The potential public health threats to workers and area residents during excavation and soil handling would include direct contact with contaminated soils and inhalation of fugitive dust. The area would be secured and access would be restricted to authorized personnel only. Standard dust control measures such as wind screens and water sprays would be used, as necessary, to minimize fugitive dust emission resulting from excavation and soil handling. Air monitoring, both in the work zone and at the perimeter of the property, would be conducted throughout the remediation activities to ensure the nearby community is not exposed to site-related contamination.

The health and safety program would address the measures for protection against the principal threat hazards. The risk to workers would be minimized by the use of standard health and safety practices such as enclosed cabs on excavation equipment and proper PPE to prevent direct contact with contaminated soil and inhalation of fugitive dust.

Short-term impacts on the environment resulting from removal of vegetation and destruction of habitat in the soil would be minimal since the area has minimal vegetation and wildlife. Impacts would be temporary and would be mitigated by restoring the remediated area. Erosion control measures, such as silt fencing, would be provided during excavation activities to control migration of contaminated soil. Short-term impacts to the environment would also include increased traffic and noise, resulting from hauling soil off-site and clean fill on-site. Coordination with local authorities will be necessary to minimize impacts on local traffic patterns. Construction activities would be performed in accordance with any local noise ordinances to minimize impacts to the community.

A total period of one to two years is estimated for this remedial alternative for planning, design, and procurement. Construction work associated with this alternative is expected to take an additional one to two years.

Implementability

Technical Feasibility

All the components of this remedial alternative are well developed and commercially available. The large volumes of excavated soil designated for off-site disposal may require identification of multiple disposal facilities. If perched water is encountered during excavation of soils, dewatering may be required. This alternative would be more difficult to implement if the buildings were not removed. Excavation near and between buildings may require the use of shoring and specialized equipment, and it may not be possible to achieve the cleanup objective, and the cap would need to be designed and constructed around the structures. Sufficient area is available on the facility for staging wastes.

Administrative Feasibility

Implementation of this alternative would require restricting access to the facility during the remediation process. Since contamination would remain, engineering and institutional controls

400226

would be required upon completion of the remedial activities. These restrictions would require negotiations with and the cooperation of property owners.

Availability of Services and Materials

Excavation and placement of fill materials can be performed with common construction equipment and should not pose any implementation problems. Careful planning and coordination would be required to ensure that adequate quantities of material are available for efficient implementation of this alternative because of the large quantities required for filling and capping. Numerous contractors are available for construction and O&M activities for the multi-layer cap and the engineering controls.

Cost

The capital cost for this alternative would be approximately $58,000,000. The annual maintenance cost for the 19.4-acre cap and 0.7 acre engineering controls would be approximately $560,000. The present worth, calculated at a discount rate of 1 percent over a 30-year period, would be approximately $72,000,000.

4.2.4 Alternative S-4: Soil Vapor Extraction/Solidification/Multi-Layer Cap/Institutional Controls

4.2.4.1 Description

In order to treat contamination above IGWSCC and PCBs greater than 500 ppm, this alternative includes soil vapor extraction (SVE), soil solidification, and capping. SVE will address VOCs, while solidification and capping will address soils that exceed IGWSCC for all contaminants except PCBs, and soils with PCBs at concentrations greater than 500 ppm. Figure 4-4 shows the area (approximately 6.7 acres) where IGWSCC are exceeded for VOCs, which would also be the location for the SVE system. Figure 4-2 shows the areas of soil solidification, which is approximately 107,000 in place cubic yards of soil. Some soil solidification may be performed *ex situ* due to debris present in the soils. This alternative also consists of the placement of an approximate 19.4-acre multi-layer cap as described in Alternative S-3, with the excavation of approximately 7,500 in-place cubic yards of soil and debris from the capacitor disposal areas (Figure 4-5). Additionally, any "hardscape" surfaces (*e.g.*, building foundations, concrete walkways, asphalt parking areas) could be used in conjunction with the multi-layer cap. However, this would require implementation of a vapor mitigation system for the on-site buildings if such additional measures are determined to be necessary.

In addition, engineering controls would be placed over any areas of the property outside the limits of the multi-layer cap. The engineering controls would prevent direct contact with soil containing PCB soil contamination above 2 ppm. Institutional controls would also be implemented to ensure that any future activities are performed with knowledge of site conditions and appropriate health and safety controls, and to prohibit future unrestricted use of the property.

400227

4.2.4.2 Assessment

Overall Protection of Human Health and the Environment

Removal of VOCs by SVE, and solidification and capping of contaminated soil provides protection of human health and the environment by eliminating the soil exposure pathways for human and ecological receptors and minimizing migration of contaminants. The areas where solidification of contaminated soil is performed would reduce the potential human health and ecological risks associated with exposure to those contaminated soils, as well as further reducing migration of contamination. Capping of remaining contaminated soil by a multi-layer cap would provide protection of human health and the environment by minimizing the soil exposure pathways for human and ecological receptors, reducing water infiltration, and minimizing migration of contaminants. The protection due to capping would exist only as long as the cap is actively maintained, since contaminants would remain and a breach of the cap could re-establish human and/or ecological exposure routes. Engineering controls would further reduce any residual risks not addressed by SVE, solidification, or the multi-layer cap.

Compliance with ARARs

All activities for this alternative would be performed in accordance with location- and action-specific ARARs. Measures would be taken to protect wetlands and endangered species, in accordance with federal and state ARARs, such as the "Protection of Wetlands Executive Order," "Wetlands Protection at Superfund Sites," the "Wetlands Act of 1970," the "Freshwater Wetlands Protection Act Rules," the "Endangered Species Act," etc. The substantive requirements of federal and state waste management regulations regarding capping of wastes would be met.

Subsurface areas in the undeveloped portion of the site may contain former land surfaces and associated cultural resources that relate to pre-historic and/or early historic time periods. Therefore, the proposed remedial alternative for soils may expose or disturb archeological cultural resources that may be eligible to the NRHP. If subsurface archeological sites are discovered within the facility property and determined to be eligible to the NRHP under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. An MOA will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

There are no chemical-specific ARARs for contaminated soils.

Long-Term Effectiveness

The solidification of contaminated soil reduces the potential for migration of contaminants into the groundwater and/or surface water. The SVE system will reduce the concentration of certain contaminants (*i.e.*, VOCs) in the soil and the cap will further reduce infiltration; however, since contamination will remain, the potential exists for migration of contaminants into groundwater and/or surface water and the establishment of new exposure routes. Additional engineering controls

400228

in areas with PCBs greater than 2 ppm would reduce residual exposure risks. Long-term monitoring and institutional controls would be required for this alternative.

Alternative S-4 would not be permanent or effective over the long term, since principal threat waste would remain on-site and institutional controls might not reliably reduce future health risks to property owners/occupants associated with exposure to contaminated soils.

Reduction of Toxicity, Mobility, or Volume

This alternative would result in a reduction of toxicity and mobility (a reduction in volume due to the SVE system would potentially be offset by an increase in volume through solidification). The capacitor disposal areas would be excavated and disposed of off-site with treatment if necessary to meet any requirements of the disposal facility, further reducing the toxicity and volume of contaminated soils. Areas that are not treated but are capped with a multi-layer cap would exhibit some reduction in mobility of contaminants via infiltration and/or erosion, as long as the cap was adequately maintained.

Short-Term Effectiveness

During implementation of this alternative, the health and safety program will address the measures for protection against the principal threat hazards to which workers could potentially be exposed. This risk would be minimized by the use of standard health and safety practices, such as appropriate PPE, to prevent contact and inhalation. There is also the potential for nearby populations to be exposed to contaminated material, fugitive dust, and/or volatile emissions from the remediation efforts as well as increased traffic and noise, resulting from hauling soil/debris, clean fill, and capping materials. The facility would be secured during construction activities to prevent unauthorized access, and the implementation of standard dust control measures such as wind screens and water sprays would be used, as necessary, to minimize fugitive dust emission resulting from remediation efforts. Coordination with local authorities will be necessary to minimize impacts on local traffic patterns. Construction activities will be performed in accordance with any local noise ordinances to minimize impacts to the community. Erosion control measures, such as silt fencing, would be provided during excavation activities to control migration of contaminated soil. Air monitoring, both in the work zone and at the perimeter of the property, would be conducted throughout the site remediation activities to ensure the nearby community is not exposed to site-related contamination.

Other short-term impacts on the environment resulting from removal of vegetation and disturbance of habitat in the soil would be minimal since the property has minimal vegetation. Any such impacts would be temporary and would be mitigated by restoring the remediated area. Trees/shrubs would be permanently removed from areas that are capped and replaced with grass. Wildlife displacement may occur during construction activities; however, this would be temporary, and any displaced species would be expected to return after completion of remedial activities.

Planning, design, and procurement of resources for this alternative would take approximately one to two years. The SVE system is expected to operate for a period of four years. Following SVE, solidification and then capping is estimated to take an additional two to three years. Therefore, the construction work associated with this alternative is estimated to take an additional six to seven years.

Implementability

Technical Feasibility

All the components of this alternative are well developed and commercially available. SVE would require a pilot test for design and development of O&M parameters. Solidification would require a treatability study to determine the appropriate solidification agents, dosage rates, and other performance parameters that would be needed for final design, and could then be readily implemented if all buildings are removed. SVE, excavation, and capping are easily implementable technologies. However, capping could not be implemented until solidification is completed, and solidification could not be implemented until SVE is completed. Long-term monitoring and maintenance would also be required. This alternative would be more difficult to implement if the buildings where not removed, as soils beneath building foundations would need to be stabilized, and the cap would need to be designed and constructed around these structures.

Administrative Feasibility

Implementation of this alternative would require restricting access to the faciltiy during the remediation process. Since contamination would remain on-site, engineering and institutional controls would be required. These restrictions would require negotiations with and the cooperation of the property owners.

Availability of Services and Materials

SVE is well demonstrated and numerous contractors are available for installation and O&M of the SVE system. Solidification processes are also well demonstrated and require conventional materials handling equipment. They are available competitively from a number of vendors, and most reagents and additives are widely available and relatively inexpensive industrial commodities. Careful planning and coordination would be required to ensure that adequate quantities of material are available for efficient implementation due to the large quantities of materials required.

Construction services for cap construction are readily available as these represent conventional construction activities. Careful planning and coordination would be required to ensure that adequate quantities of material are available for efficient implementation of this alternative because of the large quantities required for capping. Numerous contractors are available for construction and O&M activities for the multi-layer cap and the engineering controls.

Cost

For cost purposes, *in situ* solidification was assumed for this alternative. The capital cost for this alternative would be approximately $25,000,000. Equipment maintenance for solidification equipment for one year and SVE equipment for four years would be approximately $330,000. The annual maintenance cost of the 19.4-acre multi-layer cap and 0.7 acre engineering controls would be approximately $440,000. The present worth, calculated at a discount rate of 1 percent over a 30-year period would be approximately $36,000,000.

4.2.5 Alternative S-5: Low Temperature Thermal Desorption/Multi-Layer Cap/Institutional Controls

4.2.5.1 Description

This alternative consists of the thermal desorption of approximately 107,000 in-place cubic yards of soils that exceed IGWSCC for all contaminants except PCBs, and for PCBs, all soils with concentrations greater than 500 ppm (Figure 4-2), the capping of approximately 19.4 acres of contaminated soils and soils thermally treated by placement of a multi-layer cap as described in Alternative S-3, and the excavation and off-site disposal of approximately 7,500 in-place cubic yards of contaminated soil and debris from the capacitor disposal areas (Figure 4-5). In addition, engineering controls would be placed over areas of the property outside the limits of the multi-layer cap with soil containing contamination above 2 ppm. Institutional controls would also be implemented to ensure that any future activities are performed with knowledge of site conditions and appropriate health and safety controls, and to prohibit future unrestricted use of the property.

Low temperature thermal desorption (LTTD) is a physical separation process that is not specifically designed to destroy organics. Wastes are heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to a gas treatment system. The bed temperatures and residence times designed into these systems will volatilize selected contaminants but will typically not oxidize them.

This alternative considers two common thermal desorption designs: the rotary dryer and the thermal screw. Rotary dryers are horizontal cylinders that can be indirect- or direct-fired. The dryer is normally inclined and rotated. For the thermal screw units, screw conveyors or hollow augers are used to transport the medium through an enclosed trough. Hot oil or steam circulates through the auger to indirectly heat the medium. All thermal desorption systems require treatment of the off-gas to remove particulates and contaminants. Particulates are removed by conventional particulate removal equipment, such as wet scrubbers or fabric filters. Contaminants are removed through condensation followed by carbon adsorption, or they are destroyed in a secondary combustion chamber or a catalytic oxidizer.

4.2.5.2 Assessment

Overall Protection of Human Health and the Environment

Thermal desorption of contaminated soil would eliminate the potential human health and ecological risks associated with organic contaminants in the soils. Capping of remaining contaminated soil and reused soil that was thermally treated by a multi-layer cap would: provide protection of human health and the environment by minimizing the soil exposure pathways for human and ecological receptors, reducing water infiltration, and minimizing migration of contaminants. The protection would persist only as long as the cap was actively maintained, since contaminants would remain and a breach of

400231

the cap could re-establish human and/or ecological exposure routes. Engineering and institutional controls would further reduce any residual risks not addressed by LTTD or the multi-layer cap.

Compliance with ARARs

All activities for this alternative would be performed in accordance with location- and action-specific ARARs. Measures would be taken to protect wetlands and endangered species, in accordance with federal and state ARARs, such as the "Protection of Wetlands Executive Order," "Wetlands Protection at Superfund Sites," the "Wetlands Act of 1970," the "Freshwater Wetlands Protection Act Rules," the "Endangered Species Act," etc. The substantive requirements of federal and state waste management regulations regarding capping of wastes would be met.

Subsurface areas in the undeveloped portion of the site may contain former land surfaces and associated cultural resources that relate to pre-historic and/or early historic time periods. Therefore, the proposed remedial alternative for soils may expose or disturb archeological cultural resources that may be eligible to the NRHP. If subsurface archeological sites are discovered within the facility property and determined to be eligible to the NRHP under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. An MOA will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

There are no chemical-specific ARARs for contaminated soils.

Long-Term Effectiveness

The thermal desorption of contaminated soil would reduce the potential human health and ecological risks associated with exposure to contaminated soils. The capping of the remaining contaminated soil would eliminate the human health and ecological exposure risks, as long as the capped areas were maintained and future activities did not disrupt the capped areas, thereby re-establishing exposure routes. LTTD and capping will significantly reduce contaminant migration; however, the potential continues to exist for migration of remaining contaminants into groundwater and/or surface water and the establishment of new exposure routes. Engineering controls in areas with PCBs greater than 2 ppm would mitigate residual exposure risks. Long-term monitoring and institutional controls would be required for this alternative.

Reduction of Toxicity, Mobility or Volume

This alternative would result in a reduction of toxicity, mobility, and volume through treatment. Soils that undergo thermal desorption would exhibit a significant reduction in contaminant toxicity and mobility. Areas capped with a multi-layer cap may also exhibit further reduction in mobility of contaminants via infiltration and/or erosion, as long as the cap is adequately maintained.

Short-Term Effectiveness

During implementation of this alternative, the health and safety program will address the measures for protection against the principal threat hazards to which workers could potentially be exposed. This risk would be minimized by use of standard health and safety practices, such as appropriate PPE, to prevent contact and inhalation. There is also the potential for nearby populations to be exposed to contaminated material, fugitive dust and/or volatile emissions from the LTTD system. The facility would be secured during construction activities to prevent unauthorized access, and the implementation of standard dust control measures such as wind screens and water sprays would be used, as necessary, to minimize fugitive dust emission resulting from remediation efforts. The LTTD system off-gas would be captured and treated to prevent volatile emissions. Air monitoring, both in the work zone and at the perimeter of the property, would be conducted throughout the remediation activities to ensure the nearby community is not exposed to site-related contamination.

Short-term impacts on the environment resulting from removal of vegetation and disturbance of habitat in the soil would be minimal since the property has minimal vegetation. Impacts would be temporary and would be mitigated by restoring the remediated area. Wildlife displacement may occur during construction activities; however, this would be temporary and any displaced species would be expected to return after completion of remedial activities. Erosion control measures, such as silt fencing, would be provided during excavation activities to control migration of contaminated soil.

Short-term impacts to the environment would also include increased traffic and noise, resulting from handling soil on-site and importing clean fill and capping materials. Coordination with local authorities will be necessary to minimize impacts on local traffic patterns. Construction activities will be performed in accordance with any local noise ordinances to minimize impacts to the community.

A period of one to two years is estimated for this remedial alternative for planning, design, and procurement. Thermal desorption is estimated to take four to five years and engineering and institutional controls associated with this alternative is expected to take an additional one to two years. Therefore, the construction work associated with this alternative is expected to take a total of five to seven years.

Implementability

Technical Feasibility

All the components of this alternative are well developed and commercially available. A pilot test would be required for thermal desorption to ensure that the treatment objectives could be met. This alternative would be more difficult to implement if the buildings were not removed, as soils beneath the buildings would not be accessible and the cap would need to be designed and constructed around these structures.

Administrative Feasibility

Implementation of this alternative would require approvals for on-site thermal desorption and restricting access to the facility during the remediation process. Contamination would remain on-site and engineering and institutional controls would be required. These restrictions would require negotiations with and the cooperation of the property owners.

Availability of Services and Materials

Thermal desorption and capping processes are well demonstrated and use conventional materials handling equipment. They are available competitively from a number of vendors. Careful planning and coordination would be required to ensure that adequate quantities of material are available for efficient implementation of this alternative because of the large quantities required for capping. Numerous contractors are available for construction and O&M activities for the multi-layer cap.

Cost

The capital costs for this alternative would be approximately $40,000,000. The equipment maintenance cost for the LTTD system would be approximately $640,000. The annual maintenance cost of the 19.4-acre multi-layer cap and 0.7 acre engineering controls would be approximately $440,000. The present worth, calculated at a discount rate of 1 percent over a 30-year period, would be approximately $52,000,000.

4.3 Alternative Analysis for Buildings

4.3.1 Alternative B-1: No Action

4.3.1.1 Description

In this alternative, no remedial activities or site monitoring would be performed. This alternative does not include the implementation of institutional controls. The No Action alternative provides the baseline case for comparison with other remediation alternatives for the buildings. As required by CERCLA, five-year reviews would be performed to assess the need for additional remedial actions in the future.

4.3.1.2 Assessment

Overall Protection of Human Health and the Environment

The No Action alternative would entail no monitoring, removal, or treatment of the contaminated buildings. Buildings would be left in their current condition, and contaminant concentrations would be expected to remain the same. This alternative would not reduce the risk of human exposure to contaminants through ingestion, inhalation, and dermal contact. Additional migration of contaminants could occur over time as a result of disturbance by humans and natural processes.

Compliance with ARARs

The No Action alternative does not provide a means of monitoring the concentrations of COPCs. Federal and state standards are currently exceeded for the COPCs. Alternative B-1 will not satisfy contaminant-specific ARARs. The No Action alternative also would not comply with action-specific

ARARs for monitoring. No location-specific ARARs would be triggered by the No Action alternative.

Long-Term Effectiveness

The No Action alternative is not effective in the long term because it provides no long-term engineering or institutional controls to prevent exposures to trespassers or workers at the property. As required by CERCLA, review and evaluation of site conditions would be performed every five years. If justified by the review, additional remedial actions could be required.

Reduction of Toxicity, Mobility or Volume Through Treatment

This alternative would not involve any monitoring, removal, treatment, or disposal of the contaminants in the buildings and as such, no active reduction in toxicity, mobility, or volume of the contaminants would result due to treatment.

Short-Term Effectiveness

Under the No Action alternative, no short-term risks to remediation workers or the surrounding community and no significant impacts on public health and the environment will occur during implementation, since no remedial activities will be performed.

Implementability

Technical Feasibility

The technical feasibility of this alternative would be very high, since no remedial activities or monitoring would be performed.

Administrative Feasibility

This alternative would require administrative coordination in performing site reviews every five years. Coordination with state and local authorities may be required in the future for making decisions regarding future remedial activities, if any.

Availability of Services and Materials

No services or material would be required for this alternative.

Cost

There would be no capital or O&M costs associated with this alternative.

4.3.2 Alternative B-2: Decontamination and Surface Encapsulation/Institutional Controls

4.3.2.1 Description

In this alternative, surface decontamination is incorporated with surface encapsulation and institutional controls. A total of approximately 765,000 square feet of interior building surfaces would be addressed by this alternative. Alternative B-2 is formulated to address RAOs through application of 40 CFR 761.30(p) and 40 CFR 761.79. These regulations allow PCB-contaminated non-porous surfaces to be decontaminated so that they may be used and reused as allowed under 40 CFR 761.30(u), and allow porous surfaces to be managed in-place for the remaining life of the surface, provided that the conditions in the regulations are met.

Decontamination involves the removal of surface contamination from surfaces up to several centimeters in depth depending on the method used (*i.e.*, vacuum/pressure wash, acid etch, scarification and wipe/solvent wash). In many cases, extensive decontamination would be required to render buildings acceptable for future use. Following decontamination of porous surfaces, surface encapsulation (*e.g.*, epoxy coating) would allow the PCB-contaminated buildings to remain in service, provided that they are marked to indicate the presence of PCBs.

This alternative would also include long-term sampling and monitoring to assess any changes in site conditions. Five-year reviews, as required by CERCLA, would also be performed to assess the need for future remedial actions. Public awareness programs would be implemented to inform the public and local officials about potential hazards posed by exposure to the contaminated building materials. In addition, institutional controls would be employed to ensure that any future activities would be performed with knowledge of the site conditions and implementation of appropriate health and safety controls. (*i.e.*, an Environmental Health & Safety Plan), and to prohibit future unrestricted use of the buildings.

4.3.2.2 Assessment

Overall Protection of Human Health and the Environment

The surface decontamination and encapsulation of contaminated buildings would minimize the potential human health and ecological risks associated with exposure to the contaminated building materials. This alternative would result in overall protection of human health and the environment. The protection would persist only as long as the containment measures were actively maintained, since contaminants would remain on-site, and a breach of containment measures could re-establish exposure routes. The mobility of hazardous contaminants would also be reduced.

Compliance with ARARs

This alternative would comply with all ARARs. This alternative would comply with chemical-specific ARARs such as TSCA, since PCB contamination would be remediated per 40 CFR 761.360-.378 (porous surfaces) and 40 CFR 761.79 (non-porous surfaces). Compliance with 40 CFR 761.30(p) would reduce direct contact risks.

400236

The Spicer Manufacturing Corporation began construction on the site about 1912. It was within this industrial complex that the universal joint was manufactured and improved, making way for automatic transmissions to be developed in the modem automobile. Therefore, some of the structures extant at Cornell-Dubilier have the potential to qualify as historic properties under Criterion A (properties that are associated with events that have made a significant contribution to the broad patterns of our history); or Criterion B (properties that are associated with the lives of persons significant in our past). If structures on-site are determined to qualify as historic properties, and if the project will affect the structures, it will be necessary to develop a Memorandum of Agreement (MOA) by EPA that will include an agreed-upon approach to resolution of effects, or mitigation of effects. It is expected that such an approach would involve performing additional historical research and recordation of the structures.

Long-Term Effectiveness

The surface decontamination of contaminated buildings would reduce the potential human health risks associated with direct contact with contaminated buildings materials. Contaminated surfaces would be cleaned as per 40 CFR 761.79 and/or decontaminated and encapsulated per 40 CFR 761.30(p) and 40 CFR 761.360-.378. Long-term maintenance of the surface encapsulation would be necessary to maintain the effectiveness of this remedy.

Reduction of Toxicity, Mobility or Volume

Surface cleaning or decontamination and encapsulation through application of 40 CFR 761.79, 40 CFR 761.30(p) and 40 CFR 761.360-.378 would result in a reduction of mobility (through decontamination and encapsulation), but no substantial reduction of toxicity or volume of contaminants.

Short-Term Effectiveness

The potential public health threats to workers and area residents would include direct contact with contaminated buildings materials and inhalation of dust generated during remediation activities. The area would be secured and access would be restricted to authorized personnel only. Dust control measures would be used, as necessary, to minimize building dust emissions resulting from remediation activities. Air monitoring would be conducted throughout the building remediation activities to ensure the nearby community is not exposed to site-related contamination.

The health and safety program would address the measures for protection against the principal threat hazards. The risk to workers would be minimized by the use of standard health and safety protection practices such as proper PPE to prevent direct contact with contaminated buildings or materials, and inhalation of building dust.

A total period of one year is estimated for this remedial alternative for planning, design, and procurement. Remedial activities associated with this alternative is expected to take an additional one to two years.

Implementability

Technical Feasibility

All the components of this alternative are well developed and commercially available. Sampling would also be required as per 40 CFR 761.79.

Administrative Feasibility

Implementation of the alternative would require restricting access to the buildings during the remediation process. Contamination above ARARs would remain on-site and institutional controls would be required upon completion of the remedial activities. Record keeping would also be required per 40 CFR 761.79.

Availability of Services and Materials

Surface decontamination and encapsulation of building materials through application of 40 CFR 761.79 and 40 CFR 761.30(p) are well demonstrated and require conventional materials handling equipment. Numerous vendors are available for competitive bids.

Cost

The capital costs for this alternative would be approximately $12,000,000. This estimate includes costs associated with the relocation of an estimated 18 existing tenants (re-establishment, moving expenses, and oversight). This does not include any special handling of lead paint or asbestos. The annual maintenance cost would be approximately $220,000. The present worth calculated at a discount rate of 1 percent over a 30-year period, would be approximately $18,000,000.

4.3.3 Alternative B-3: Demolition/Off-Site Disposal

4.3.3.1 Description

This alternative consists of the demolition of the facility buildings. Demolition of all the buildings would result in an estimated 22,000 tons of debris that would be transported off-site for proper disposal. Since the debris would be disposed off-site, it is anticipated that there would be no need for institutional controls, no five-year review requirement, and no long-term monitoring requirement associated with the buildings. Debris designated for off-site disposal would be subject to analysis for disposal parameters and transported off-site for treatment (if necessary to meet the disposal facility requirements) and disposal in accordance with applicable regulations. For development of this alternative, it was assumed that 20 percent of the generated debris would be characterized as hazardous waste due to the potential presence of lead (from lead-based paint). During the remedial design, decontamination prior to demolition could be considered to reduce the quantity of hazardous waste. Non-contaminated building debris would be recycled to the extent practical. Lead or asbestos material will need to be managed in accordance with applicable regulations. Investigation may be required before demolition, if there is evidence of either, since there were no lead paint or asbestos surveys performed during the RI.

400238

4.3.3.2 Assessment

Overall Protection of Human Health and the Environment

The demolition and off-site disposal of building debris from the facility property would eliminate the potential human health and ecological risks associated with exposure to contaminants in the buildings. This alternative would result in overall protection of human health and the environment.

Compliance with ARARs

This alternative would comply with all ARARs. Risks associated with the contaminated buildings would be eliminated.

The Spicer Manufacturing Corporation began construction on the site about 1912. It was within this industrial complex that the universal joint was manufactured and improved, making way for automatic transmissions to be developed in the modem automobile. Therefore, some of the structures extant at Cornell-Dubilier have the potential to qualify as historic properties under Criterion A (properties that are associated with events that have made a significant contribution to the broad patterns of our history); or Criterion B (properties that are associated with the lives of persons significant in our past). If structures on-site are determined to qualify as historic properties, and if the project will affect the structures, it will be necessary to develop a MOA by EPA that will include an agreed-upon approach to resolution of effects, or mitigation of effects. It is expected that such an approach would involve performing additional historical research and recordation of the structures.

Long-Term Effectiveness

The demolition and removal of contaminated debris would provide a permanent solution to the contaminated buildings at the facility property. Off-site disposal of contaminated debris would eliminate the human health and ecological exposure risks.

Reduction of Toxicity, Mobility, or Volume

This alternative would result in total reduction of contaminant mobility and volume through demolition and off-site disposal. There would be no reduction in contaminant toxicity if the debris were disposed of at a landfill without any treatment. If necessary to meet the disposal facility requirements, the materials would be treated at the off-site facility prior to disposal, reducing toxicity.

Short-Term Effectiveness

The potential public health threats to workers and area residents would include direct contact with contaminated building surfaces and inhalation of fugitive dust generated during demolition. The area would be secured and access would be restricted to authorized personnel only. The implementation of standard dust control measures such as wind screens and water sprays would be used, as necessary, to minimize fugitive dust emission resulting from demolition. Air monitoring both in the work zone and at the perimeter of the property, would be conducted throughout the remediation activities to ensure the nearby community was not exposed to site-related contamination.

The health and safety program would address the measures for protection against the principal threat hazards. The risk to workers would be minimized by the use of standard health and safety protection practices such as enclosed cabs on equipment and proper PPE to prevent direct contact with contaminated material and inhalation of fugitive dust.

Short-term impacts to the environment would be caused by potential fugitive emissions during handling of debris and increased traffic and noise, resulting from hauling debris. Wildlife displacement may occur during remediation activities; however, impacts would be expected to be minimal, as there are no significant habitats in the building area. Any impacts would also be temporary, and any displaced species would be expected to return after completion of site activities.

A total period of one to two years is estimated for this remedial alternative for planning, design, and procurement. Construction work associated with this alternative is expected to take an additional one to two years.

Implementability

Technical Feasibility

All the components of this remedial alternative are well developed and commercially available. The large volumes of debris designated for off-site disposal may require identification of multiple disposal facilities. However, sufficient area is available on the property for staging wastes. Demolition, off-site transportation, and restoration of the property could be performed with little difficulty.

Administrative Feasibility

Implementation of this alternative would require restricting access to the building area during the remediation process. Since contaminated material would be disposed off-site, contamination would not remain at the property, and institutional controls would not be required, with respect to the buildings, upon completion of the remedial activities.

Availability of Services and Materials

This alternative uses common construction equipment, and implementation should not pose any problems. The large volume of material may require the identification of multiple disposal facilities. Lead and/or asbestos mitigation contractors are available, if necessary.

Cost

The total capital cost for this alternative is estimated to be $7,000,000. There is no O&M cost associated with this alternative. The estimate assumes off-site disposal of debris that is 20 percent hazardous and 80 percent non-hazardous, and does not include lead or asbestos mitigation. It includes the relocation costs for an estimated 18 existing tenants (*i.e.,* re-establishment, moving, and oversight).

4.4 Comparative Analysis of Remedial Alternatives for Facility Soils

This section presents a comparison of the relative performance of each remedial alternative for facility soils using the seven evaluation criteria discussed previously. The comparative analysis was performed in a qualitative manner, to identify substantive differences between the alternatives. A summary of the comparative analysis for facility soils remedial alternatives is presented in Table 4-1.

4.4.1 Overall Protection of Human Health and the Environment

Alternative S-2 would be the most protective of human health and the environment, since the largest quantity of contaminated soil would be removed from the facility, providing the greatest reduction in risk to human health and the environment; engineering and institutional controls would mitigate any residual risks. Alternatives S-3, S-4, and S-5 would also be protective of human health and the environment through the removal and/or treatment of the contaminants posing the greatest risk. The residual risks for Alternatives S-3, S-4, and S-5 would vary, and would all be higher than Alternative S-2; however, the residual risks associated with all of these alternatives would be mitigated by placement of a multi-layer cap and engineering and institutional controls. Alternative S-1 would not be protective of human health and the environment, since there would be no containment, removal, or treatment of the soil contaminants.

4.4.2 Compliance with ARARs

Alternatives S-2, S-3, S-4, and S-5 would be performed in accordance with location- and action-specific ARARs. Although there are no chemical specific ARARs for soils, the cleanup goals for PCBs of 10 ppm (S-2) and 500 ppm (S-3, S-4, and S-5) would leave PCBs in the soil above the EPA SSL for Direct Ingestion (1 ppm), which is a TBC. Engineering and institutional controls would mitigate any residual risks.

If subsurface archeological sites are discovered within the facility property and determined to be eligible to the NRHP under Criterion D (properties that have yielded or may be likely to yield information important in prehistory or history), and if the project will effect these significant properties, then a MOA that would cover these sites would be developed by EPA. An MOA will include an agreed-upon approach to resolution of effects, or mitigation of effects that could involve an approach such as data recovery.

Alternative S-1 would not satisfy chemical-specific ARARs or action-specific ARARs for monitoring. No location-specific ARARs would be triggered by the No Action alternative.

4.4.3 Long-Term Effectiveness

Alternative S-2 would provide the greatest long-term effectiveness, since the largest quantity of contaminants are removed from the property under this alternative. Alternatives S-3, S-4, and S-5 vary in the quantity of contaminated material removed and/or treated, but all have higher residual contamination levels than Alternative S-2. The effectiveness, from highest to lowest, is; S-2, S-3, S-5, and S-4. Alternatives S-2, S-3, S-4, and S-5 all have some level of residual contamination, and would require engineering and institutional controls. Alternative S-1 leaves the highest residual contamination at the property, and does not provide any mechanism to mitigate the existing risks.

4.4.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative S-2 provides the greatest reduction in toxicity, mobility and volume of contamination at the facility, but the reduction is via removal and off-site disposal of contaminated material from the property, which may not necessarily entail treatment of the contaminated soils. Alternative S-3 also provides a significant reduction in toxicity, mobility and volume of contamination at the facility, but again through removal, and to a lesser extent than Alternative S-2. Alternatives S-4 and S-5 employ treatments (SVE/Solidification and LTTD, respectively) that would reduce the volume of contaminated soil; however, the treatments are not necessarily destructive, resulting only in the transfer of contaminants from one medium to a lesser volume of another medium, which would require off-site disposal. Alternative S-3 would reduce the mobility of contaminants via stabilization, but would not substantially alter the toxicity or volume of contaminated material. Alternative S-1 provides no reduction in toxicity, mobility, or volume.

4.4.5 Short-Term Effectiveness

Alternative S-1 would pose no risk to workers or the community during implementation, since no remedial activities would be performed. Alternative S-4 would pose a lower risks to workers, since the *in situ* treatments associated with this alternative would cause substantially less disturbance of contaminated soils than Alternatives S-2, S-3, and S-5. Alternatives S-4 and S-5 would generate volatile emissions which would need to be controlled to protect workers and the community. Alternatives S-3 and S-5 would require excavation of approximately the same quantity of contaminated soil, with potential volatile and dust emissions that would need to be controlled to protect workers and the community. Alternatives S-2 and S-3 would involve significant truck traffic through the community, with risks of accidents, spills, and dust and volatile emissions.

For all of the active alternatives, air monitoring would be conducted throughout the remediation activities to ensure the nearby community is not exposed to site-related contamination. The risk to workers would be minimized by the use of standard health and safety practices such as enclosed cabs on excavation equipment and proper personal protective equipment (PPE) to prevent direct contact with contaminated soil and inhalation of fugitive dust.

4.4.6 Implementability

Technical Feasibility

Alternative S-1 is the easiest alternative to implement, since no remedial activities would take place. Alternatives S-2, S-3, S-4, and S-5 employ conventional technologies that are readily available from multiple vendors. Should additional remedial activities be deemed necessary in the future, Alternative S-2 would best facilitate such activities, since only engineering controls would potentially need to be disturbed and replaced; all of the other alternatives could potentially require disturbance and replacement of the multi-layer cap.

Administrative Feasibility

All of the alternatives would leave PCBs at the property above EPAs soil screening level of 1 ppm for direct contact, thus all of the alternatives would require institutional controls, five-year reviews and coordination with state and local authorities for making decisions with regard to additional remedial activities. Alternatives S-2, S-3, S-4, and S-5 would also require restricting access to the property during implementation.

Availability of Services and Materials

Alternative S-1 would not require any services or material. Alternatives S-2, S-3, S-4, and S-5 would all require common construction services and materials for implementation of the remedies, as well as O&M services for the cap, engineering controls and institutional controls. All of the alternatives except S-1 require off-site disposal, but Alternatives S-2 and S-3 would require the most substantial off-site disposal services and substantial quantities of clean fill material; multiple disposal facilities and vendors may be necessary to meet these needs for these alternatives.

4.4.7 Cost

There would be no capital or O&M costs associated with Alternative S-1. The remaining alternatives have net present worth costs ranging from $36,000,000 to $114,000,000, increasing in the following order: S-4, S-5, S-3, S-2.

4.5 Comparative Analysis of Remedial Alternatives for Buildings

This section presents a comparison of the relative performance of each remedial alternative for contaminated buildings using the seven evaluation criteria discussed previously. The comparative analysis was performed in a qualitative manner, to identify substantive differences between the alternatives. A summary of the comparative analysis for building remedial alternatives is presented in Table 4-2.

4.5.1 Overall Protection of Human Health and the Environment

Alternative B-3 would be the most protective of human health and the environment, since the contaminated buildings would be demolished, and the debris removed from the facility and disposed of appropriately. B-2 would also be protective, allowing for the continued use of the buildings; however, there is the potential for the encapsulation to fail and exposure routes to be re-established. Alternative B-1 would not be protective, since the contaminated buildings would not be subject to any remediation.

4.5.2 Compliance with ARARs

Alternatives B-2 and B-3 would be performed in accordance with location- and action-specific ARARs. These alternatives would also comply with contaminant-specific ARARs. Alternative B-1 would not satisfy contaminant-specific ARARs or action-specific ARARs for monitoring. No location-specific ARARs would be triggered by Alternative B-1.

The Spicer Manufacturing Corporation began construction on the site about 1912. It was within this industrial complex that the universal joint was manufactured and improved, making way for automatic transmissions to be developed in the modem automobile. Therefore, some of the structures extant at Cornell-Dubilier have the potential to qualify as historic properties under Criterion A (properties that are associated with events that have made a significant contribution to the broad patterns of our history); or Criterion B (properties that are associated with the lives of persons significant in our past). If structures on-site are determined to qualify as historic properties, and if the project will affect the structures, it will be necessary to develop a Memorandum of Agreement (MOA) by EPA that will include an agreed-upon approach to resolution of effects, or mitigation of effects. It is expected that such an approach would involve performing additional historical research and recordation of the structures.

4.5.3 Long-Term Effectiveness

Alternative B-3 provides the highest long-term effectiveness, since contaminants would be removed from the property, and there is no future risk of exposure. Alternative B-2 would also be effective; however, since contaminants are encapsulated and left at the property, there is the potential that the encapsulation could fail and the exposure routes be re-established. Alternative B-1 is the least effective, since it provides no long-term engineering or institutional controls to prevent exposure to contaminants which are left at the property.

4.5.4 Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative B-3 provides the greatest reduction in toxicity, mobility and volume of contamination on the property, but the reduction is via removal and off-site disposal of contaminated building debris from the property, not by treatment. Alternative B-2 also provides a significant reduction mobility of contamination at the property through decontamination and encapsulation; some residual contamination would remain under this alternative, but it would be encapsulated. Alternative B-1 provides no reduction in toxicity, mobility, or volume. Alternative B-3 would generate the largest quantity of waste material for disposal (*i.e.*, contaminated building debris). Alternative B-2 would generate substantially less waste material for disposal, consisting only of water and/or dust from the building decontamination. Alternative B-1 would not generate waste for disposal.

4.5.5 Short-Term Effectiveness

Alternative B-1 would pose no risk to workers or the community during implementation, since no remedial activities would be performed. Alternatives B-2 and B-3 would pose potential risks to workers and the local community from contaminated dust generated during decontamination and demolition activities, respectively, and during the transport of debris during Alternative B-3. Dust control measures would be implemented if needed. For both of these alternatives, air monitoring would be conducted throughout the remediation activities to ensure the nearby community is not exposed to site-related contamination. The risk to workers would be minimized by the use of standard health and safety practices such as enclosed cabs on heavy equipment and PPE to prevent direct contact with and inhalation of fugitive dust.

4.5.6 Implementability

Technical Feasibility

Alternative B-1 is the easiest alternative to implement, since no remedial activities would take place. Alternatives B-2 and B-3 both employ conventional technologies that are readily available from multiple vendors. No additional remedial activities would be necessary under Alternative B-3. For Alternative B-2, should the encapsulation fail, re-application would be possible. Alternative B-2 would require long-term monitoring, which would not be required under Alternative B-3.

Administrative Feasibility

Alternative B-3 would require coordination with local authorities for transportation of the large quantity of building debris that would be generated; however, no long-term administrative requirements would be associated with this alternative, since the contamination would be permanently removed from the facility. Alternatives B-1 and B-2 would leave contamination in the buildings above applicable cleanup requirements. Alternative B-2 would require institutional controls to provide notification of the contaminated building materials and prohibit unrestricted future use. Alternatives B-1 and B-2 would also require five-year reviews and coordination with state and local authorities for making decisions with regard to additional remedial activities.

Availability of Services and Materials

Alternative B-1 would not require any services or material. Alternatives B-2 and B-3 would both require common construction services and materials for implementation of the remedies. Alternatives B-2 and B-3 would both require off-site disposal services, with Alternative B-3 generating substantially more debris for off-site disposal; multiple disposal facilities may be necessary for Alternative B-3. Alternative B-2 would also require long-term monitoring and O&M services for the encapsulated contamination.

4.5.7 Cost

There would be no capital or O&M costs associated with Alternative B-1. Alternative B-3 has the lower present worth cost of $7,000,000 of the two active remedial alternatives. Alternative B-2 has the higher present worth cost of $18,000,000.

SECTION 4

TABLES

TABLE 4-1 (Sheet 1 of 5)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOILS

CRITERIA	Alternative S-1 No Action	Alternative S-2 Excavation/ Off-Site Disposal/Institutional Controls	Alternative S-3 "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/ Institutional Controls	Alternative S-4 SVE/Solidification/ Multi-Layer Cap/ Institutional Controls	Alternative S-5 Low Temperature Thermal Desorption/ Multi-Layer Cap/ Institutional Controls
Description	No remedial actions. 5-year reviews.	Excavation and off-site disposal of contaminated soils that exceed IGWSCC, and PCBs > 10 ppm. Additionally, the Capacitor Disposal Areas would be excavated and disposed of off-site.	Excavation and off-site disposal of contaminated soils that exceed IGWSCC and PCBs > 500 ppm. PCBs >10 ppm would be placed under a multi-layer cap; other soils with PCBs > 2 ppm would be covered with engineering controls. In addition, the Capacitor Disposal Areas would be excavated and disposed off-site.	Treatment of VOCs > IGWSCC by SVE, solidification of soils with PCBs > 500 ppm, PCBs >10 ppm would be placed under a multi-layer cap; other soils with PCBs > 2ppm would be covered with engineering controls. In addition, the Capacitor Disposal Areas would be excavated and disposed off-site.	LTTD of soils that exceed IGWSCC and PCBs > 500 ppm. PCBs > 10 ppm would be placed under a multi-layer cap; other soils exceeding 2 ppm would be covered with engineering controls. In addition, the Capacitor Disposal Areas would be excavated and disposed off-site.
1. Overall Protection of Human Health and the Environment	Not protective of human health or the environment.	Excavation would minimize the potential human health and ecological risks. However, residual risks from PCB concentrations would remain; mitigated by engineering and institutional controls.	Less protective than S-2 since contaminated soil (i.e., PCBs < 500 ppm) would still remain at the facility. Exposure to contamination would be minimized by cap, engineering and institutional controls.	Less protective than S-3 since more highly contaminated soil (PCBs > 500 ppm) will remain but higher mobility reduction through solidification. Exposure to contamination would be minimized by cap, engineering and institutional controls.	Less residual contamination than S-4 or S-5; exposure to residual contamination would be minimized by cap, engineering and institutional controls.
2. Compliance with ARARs					
• Compliance with Contaminant-Specific ARARs	No contaminant specific ARARs	No contaminant specific ARARs. EPA SSL's would not be achieved. Exposure would be minimized through engineering and institutional controls.	Same as S-2.	Same as S-2.	Same as S-2.
• Compliance with Action-Specific ARARs	Would not comply with action-specific ARARs.	Would be performed in compliance with action-specific ARARs.	Same as S-2.	Same as S-2.	Same as S-2.
• Compliance with Location-Specific ARARs	No location-specific ARARs triggered.	Would be performed in compliance with location-specific ARARs.	Same as S-2.	Same as S-2.	Same as S-2.

TABLE 4-1 (Sheet 2 of 5)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOILS

CRITERIA	Alternative S-1 No Action	Alternative S-2 Excavation/ Off-Site Disposal/Institutional Controls	Alternative S-3 "Principal Threat" Excavation/ Off-Site Disposal/Multi-Layer Cap/ Institutional Controls	Alternative S-4 SVE/Solidification/ Multi-Layer Cap/ Institutional Controls	Alternative S-5 Low Temperature Thermal Desorption/ Multi-Layer Cap/ Institutional Controls
3. Long-Term Effectiveness					
• Magnitude of Residual Risks	No immediate reduction in baseline risk. Risk would potentially be reduced over time through natural attenuation processes.	Substantial risk reduction by excavation and off-site disposal. PCBs < 10 ppm would remain.	Risk reduced by excavation and off-site disposal; contaminated soil remains on-site under multi-layer cap.	Risk reduced by SVE and solidification; contaminated soil remains on-site under multi-layer cap.	Residual risk reduced by LTTD; contaminated soil remains on-site under multi-layer cap.
• Adequacy of Controls	No controls implemented.	Engineering and institutional controls would mitigate residual exposure risk.	Multi-layer cap and engineering and institutional controls mitigate risk of exposure to remaining contaminated soil on-site.	Same as S-3.	Same as S-3.
• Reliability of Controls	No controls implemented.	Engineering controls would need to be maintained, and could be breached with re-establishment of exposure routes.	Multi-layer cap and engineering controls require maintenance to ensure integrity; breach of the controls and re-establishment of exposure routes is possible.	Same as S-3.	Same as S-3.
4. Reduction of Toxicity, Mobility or Volume					
• Treatment Process and Remedy	None	Excavation and off-site disposal of contaminated soils, including Capacitor Disposal Area, and engineering and institutional controls.	Excavation and off-site disposal of contaminated soil including Capacitor Disposal Area in conjunction with a multi-layer cap and engineering and institutional controls.	SVE, either *in situ* or *ex situ* solidification, and excavation of Capacitor Disposal Area in conjunction with a multi-layer cap and engineering and institutional controls.	LTTD and excavation of Capacitor Disposal Area in conjunction with a multi-layer cap and engineering and institutional controls.

400248

TABLE 4-1 (Sheet 3 of 5)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOILS

CRITERIA	Alternative S-1 No Action	Alternative S-2 Excavation/ Off-Site Disposal/Institutional Controls	Alternative S-3 "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/ Institutional Controls	Alternative S-4 SVE/Solidification/ Multi-Layer Cap/ Institutional Controls	Alternative S-5 Low Temperature Thermal Desorption/ Multi-Layer Cap/ Institutional Controls
• Amount of Hazardous Material Destroyed or Treated	None	An estimated 272,000 cubic yards of contaminated soil and debris removed from the facility.	An estimated 107,000 cubic yards of contaminated soil and debris removed from the facility.	Same as S-3.	Same as S-3.
• Reduction of Toxicity, Mobility or Volume	No reduction of toxicity mobility or volume except by natural attenuation processes.	Significant reduction in toxicity, mobility and volume of contaminants as a result of removal from the site.	Same as S-2 for excavated areas. Capped areas show reduced mobility, but no decrease in volume or toxicity.	Some reduction in toxicity, mobility, and volume in areas of excavation, solidification, and SVE system. Capped areas show reduced mobility, but no decrease in volume or toxicity.	Some reduction in toxicity, mobility, and volume in areas where soil is treated. Capped areas show reduced mobility, but no decrease in volume or toxicity.
• Irreversibility of Treatment	No treatment. Natural attenuation is irreversible.	Soil removal from the facility is irreversible.	Same as S-2 for excavated material.	Same as S-2 for excavated material. VOC removal is irreversible. Solidified material could degrade.	Same as S-2 for excavated material. LTTD is irreversible.
• Type and Quantity of Residual Waste	No residual waste, since no treatment involved.	None, since no waste treated. However, soil may be treated off-site.	Same as S-2.	Same as S-2. For VOCs, off-gas from SVE system.	Off-gas from LTTD process.
5. <u>Short-Term Effectiveness</u>					
• Protection of Community During Remedial Activities	No short term risk to community.	Short-term risks to the community from contaminated dust will be controlled by dust control measures. Facility access will be restricted.	Same as S-2 but less disturbance due to smaller excavation volume.	Same as S-3. Also, off-gas needs to be treated.	Same as S-3. Off-gases need treatment.
• Protection of Workers During Remediation	No remediation, therefore not applicable.	Short-term risks to remediation workers will be controlled by health and safety program. Dust control measures will be implemented with air monitoring.	Same as S-2.	Same as S-2.	Same as S-2.

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOILS

CRITERIA	Alternative S-1 No Action	Alternative S-2 Excavation/ Off-Site Disposal/Institutional Controls	Alternative S-3 "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/ Institutional Controls	Alternative S-4 SVE/Solidification/ Multi-Layer Cap/ Institutional Controls	Alternative S-5 Low Temperature Thermal Desorption/ Multi-Layer Cap/ Institutional Controls
• Environmental Impacts	Potential exposure to contaminated soil.	Wildlife displacement may occur due to remedial construction activities. Expected to return at completion of activities.	Same as S-2.	Same as S-2.	Same as S-2.
• Time Until Protection is Achieved	No time required for implementation of No Action. Protection not achieved.	Time required for implementation is estimated to be one to two years. Time required for remediation is estimated to be an additional two years.	Time required for implementation is estimated to be one to two years. Time required for remediation is estimated to be an additional one to two years.	Time required for implementation is estimated to be one to two years. The SVE system is estimated to operate for four years, and solidification and engineering controls associated with this alternative is estimated to be an additional two to three years. Total construction time is estimated to be six to seven years.	Time required for implementation is estimated to be one to two years. Thermal desorption is estimated to be four to five years and engineering controls an additional one to two years. Total construction time is estimated to be 5 to 7 years.
6. <u>Implementability</u>					
Technical Feasibility					
• Ability to Construct and Operate Technology	No construction involved.	Conventional construction equipment used.	Same as S-2	Same as S-2. SVE, *in situ*, and *ex situ* solidification techniques are established technologies.	Same as S-2. Requires LTTD unit(s).
• Reliability of Technology	Does not involve any technology.	Conventional equipment and techniques. Very reliable.	Same as S-2.	Same as S-2. SVE and solidification are proven technologies. Pilot tests required.	Same as S-2. LTTD is a proven technology. Pilot test required.
• Ease of Undertaking Additional Remedial Action if Necessary	If future action is necessary, must go through the FS/ROD process again.	None required.	Would need to disturb multi-layer cap.	Same as S-3.	Same as S-3.
• Monitoring Consideration	No monitoring program.	Requires long-term monitoring of engineering and institutional controls.	Requires monitoring the integrity of multi-layer cap and engineering and institutional controls.	Same as S-3 and monitoring of SVE system.	Same as S-3 and monitoring of LTTD system.

400250

TABLE 4-1 (Sheet 5 of 5)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR SOILS

CRITERIA	Alternative S-1 No Action	Alternative S-2 Excavation/Off-Site Disposal/Institutional Controls	Alternative S-3 "Principal Threat" Excavation/Off-Site Disposal/Multi-Layer Cap/ Institutional Controls	Alternative S-4 SVE/Solidification/ Multi-Layer Cap/ Institutional Controls	Alternative S-5 Low Temperature Thermal Desorption/ Multi-Layer Cap/ Institutional Controls
Administrative Feasibility					
• Coordination with Other Agencies	None required.	Significant coordination with regulatory agencies, tenants, and property owners.	Same as S-2.	Same as S-2.	Same as S-2.
Availability of Services and Materials					
• Availability of Treatment Capacity and Disposal Services	None required.	Approved off-site disposal facilities are available. Multiple facilities may be required to handle large volumes of soil.	Same as S-2, but less volume.	Off-gas from SVE system treated on-site. Solidification does not generate significant quantities for off-site disposal. Material from capacitor disposal area can be disposed off-site.	Off-gases from LTTD system treated on-site. Material from capacitor disposal area can be disposed off-site.
• Availability of Necessary Equipment and Specialist	No equipment or specialist needed.	Utilizes common construction equipment and materials.	Same as S-2.	Same as S-2. Utilizes SVE equipment.	Same as S-2. Utilizes LTTD equipment and specialists.
• Availability of Technologies	No technology required.	Utilizes common construction techniques and methods.	Same as S-2.	Same as S-2. SVE systems are widely available.	Same as S-2. LTTD units available commercially.
7. <u>Costs</u>					
• Total Capital Cost ($)	• $0	• $111,000,000	• $58,000,000	• 25,000,000	• $40,000,000
• Remediation Equipment O&M costs ($)	• $0	• $0	• $0	• 330,000	• $640,000
• Annual Operation and Maintenance Cost ($/yr)	• $0	• $124,000	• $560,000	• $440,000	• $440,000
• Present Worth $ (30 year, 1% Basis)	• $0	• $114,000,000	• $72,000,000	• $36,000,000	• $52,000,000

TABLE 4-2 (Sheet 1 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR BUILDINGS

CRITERIA	Alternative B-1 No Action	Alternative B-2 Decontamination and Surface Encapsulation/Institutional Controls	Alternative B-3 Demolition/Off-Site Disposal
Description	No remedial actions. 5-year reviews.	Building surfaces would be decontaminated as per 40 CFR 761.360-.378 and 40 CFR 761.360-.378 and 40 CFR 761.79 and encapsulated per 40 CFR 761.30 (p).	This alternative consists of the demolition of the contaminated buildings. Additionally, a lead and/or asbestos abatement would be performed, if necessary.
1. Overall Protection of Human Health and the Environment	Not protective of human health or the environment.	Less than B-3; contamination will remain, mobility reduced by encapsulation.	Demolition would eliminate the potential human health risk. Contaminated building debris would be removed from the property, thereby providing protection against direct contact. Recycling of non-contaminated debris would be protective provided that the waste was properly characterized and/or decontaminated. This alternative would result in overall protection of human health and the environment.
2. Compliance with ARARs			
• Compliance with Contaminant-Specific ARARs	No contaminant-specific ARARs would be achieved.	Would be performed in compliance with contaminant-specific ARAR.	Same as B-2.
• Compliance with Action-Specific ARARs	Would not comply with action-specific ARARs.	Would be performed in compliance with action-specific ARARs.	Same as B-2.
• Compliance with Location-Specific ARARs	No location-specific ARARs triggered.	Would be performed in compliance with location-specific ARARs.	Same as B-2.
3. Long-Term Effectiveness			
• Magnitude of Residual Risks	No reduction in risk.	Residual risk is reduced, but contamination remain on-site	Residual risk is removed with the demolition of the buildings.
• Adequacy of Controls	No controls implemented.	Encapsulation mitigates the risk of exposure to contaminated building materials.	No controls required after building demolition.
• Reliability of Controls	No controls implemented.	Encapsulation requires maintenance to ensure integrity; re-establishment of exposure routes is possible.	Minimizes potential for contamination migration. Effective long-term remedy that permanently removes contaminated building material and either disposes contaminated debris off-site or recycles non-contaminated material.

400252

TABLE 4-2 (Sheet 2 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR BUILDINGS

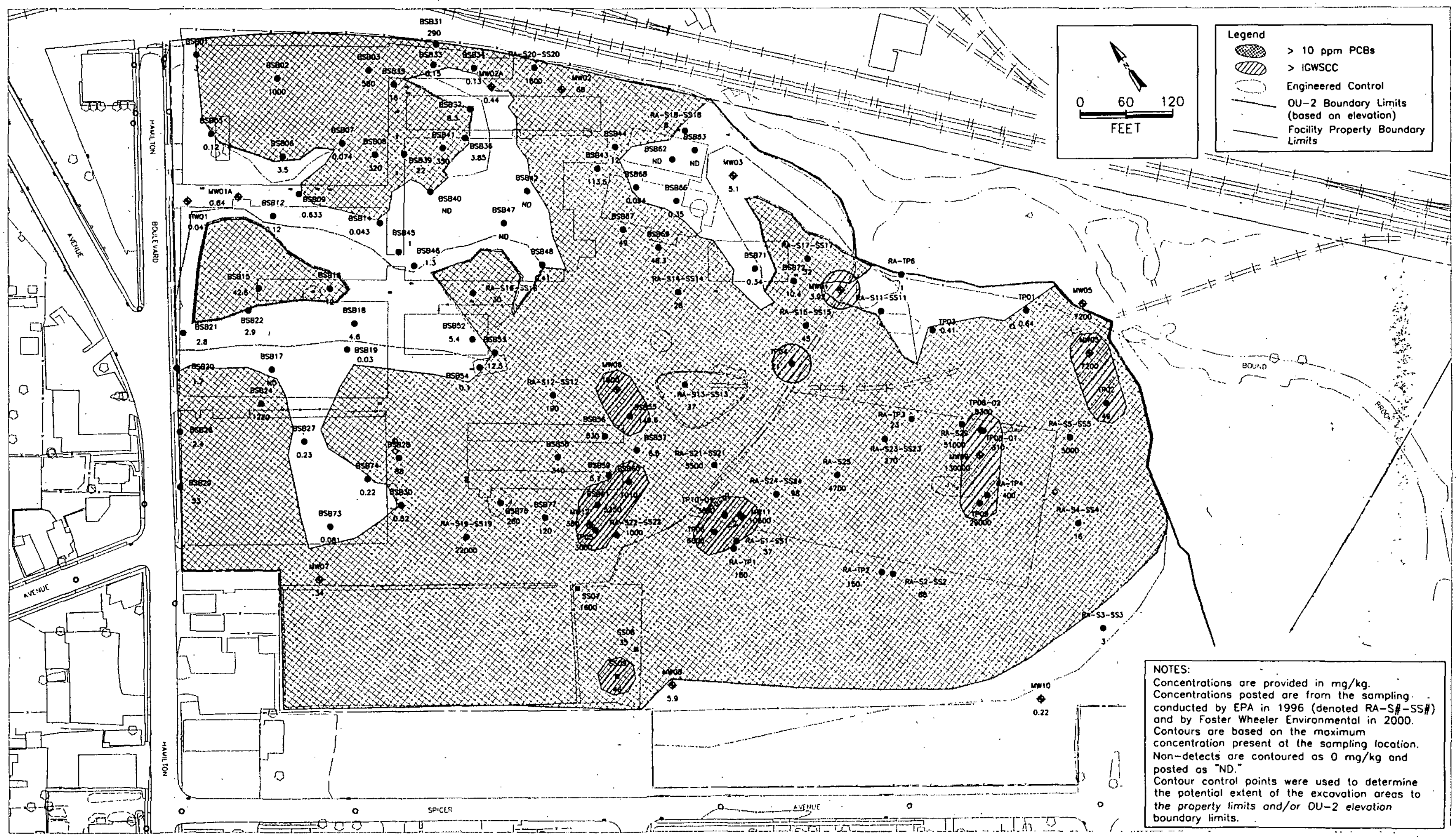
CRITERIA	Alternative B-1 No Action	Alternative B-2 Decontamination and Surface Encapsulation/Institutional Controls	Alternative B-3 Demolition/Off-Site Disposal
4. Reduction of Toxicity, Mobility or Volume			
• Treatment Process and Remedy	None.	Reduction in volume and mobility of contaminants through decontamination and encapsulation, respectively.	Demolition and off-site disposal of building demolition debris.
• Amount of Hazardous Material Destroyed or Treated	None.	18 buildings, approximately 765,000 sq. ft. No remedial activities are anticipated for building exteriors.	Estimated 22,000 tons of building demolition debris.
• Reduction of Toxicity, Mobility or Volume	No reduction of toxicity, mobility, or volume of contamination.	Decrease in mobility due to decontamination and subsequent encapsulation.	Significant reduction in toxicity, mobility, and volume through removal.
• Irreversibility of Treatment	No treatment.	Coating used in encapsulation may degrade over time or through wear.	Contaminated building debris removal from the site is irreversible.
• Type and Quantity of Residual Waste	No residual waste, since no treatment involved.	PCB dust from building surface decontamination and decontamination water/fluids	Building demolition debris.
5. Short-Term Effectiveness			
• Protection of Community During Remedial Activities	No short-term risk to the community.	Short-term risks to the community from migration of contaminated dust will be controlled by standard dust suppression techniques with air monitoring, and restricted site access.	Same as B-2.
• Protection of Workers During Remediation	No remediation, therefore not applicable.	Short-term risks to remediation workers will be controlled by the health and safety program, including dust control measures and air monitoring.	Same as B-2.
• Environmental Impacts	No sensitive environs in building area.	No environmental impacts are anticipated. No sensitive environs in building area.	Same as B-2.
• Time Until Protection is Achieved	No time required for implementation of No Action. Protection not achieved.	Time required for implementation is estimated to be one year. Time required for remediation is estimated to be an additional one to two years.	Time required for implementation is estimated to be one to two years. Time required for remediation is estimated to be one to two years.

TABLE 4-2 (Sheet 3 of 3)
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
COMPARATIVE ANALYSIS OF ALTERNATIVES FOR BUILDINGS

CRITERIA	Alternative B-1 No Action	Alternative B-2 Decontamination and Surface Encapsulation/Institutional Controls	Alternative B-3 Demolition/Off-Site Disposal
6. <u>Implementability</u>			
Technical Feasibility			
• Ability to Construct and Operate Technology	No construction involved.	Readily implemented using standard construction equipment.	Same as B-2
• Reliability of Technology	Does not involve any technology.	Encapsulation can fail or degrade.	Contamination removed.
• Ease of Undertaking Additional Remedial Action if necessary	If future action is necessary, must go through the FS/ROD process again.	If encapsulation fails or degrades, surfaces will be re-sealed.	No additional action required.
• Monitoring Consideration	No monitoring program.	Requires long-term monitoring of encapsulated surfaces.	No long-term monitoring
Administrative Feasibility			
• Coordination with Other Agencies	None required.	Requires coordination with regulatory agencies, tenants and property owners, plus long-term O&M and institutional controls.	Requires coordination with regulatory agencies, tenants, and property owners.
Availability of Services and Materials			
• Availability of Treatment Capacity and Disposal Services	None required.	Collected building dust would be disposed of off-site.	Approved off-site disposal facilities are available. Large volumes of construction debris may require identification of multiple facilities. Non-contaminated building debris may be recycled.
• Availability of Necessary Equipment and Specialist	No equipment or specialist needed.	Utilizes common construction equipment and materials.	Same as B-2.
• Availability of Technologies	No technology required.	Utilizes common construction techniques and methods.	Same as B-2.
7. <u>Costs</u>			
• Total Capital Cost ($)	• $0	• $12,000,000	• $7,000,000
• Annual Operation and Maintenance Cost ($/yr)	• $0	• $220,000	• $0
• Present Worth $ (30 year, 1% Basis)	• $0	• $18,000,000	• $7,000,000

SECTION 4

FIGURES



400256

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		DES.: LEN	APPD: RC	

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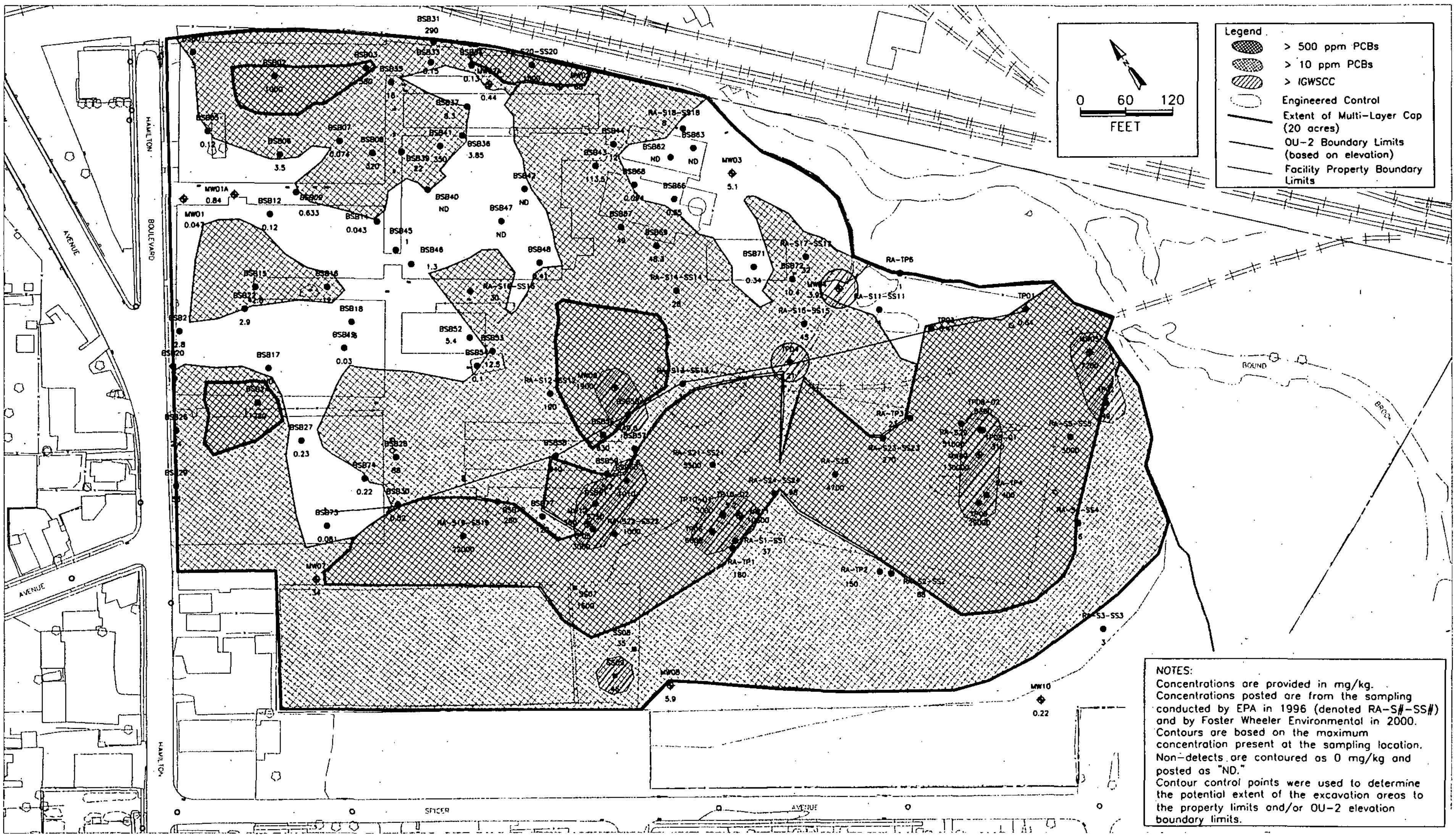

400257

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	DES.: LEN	APPD: RC	

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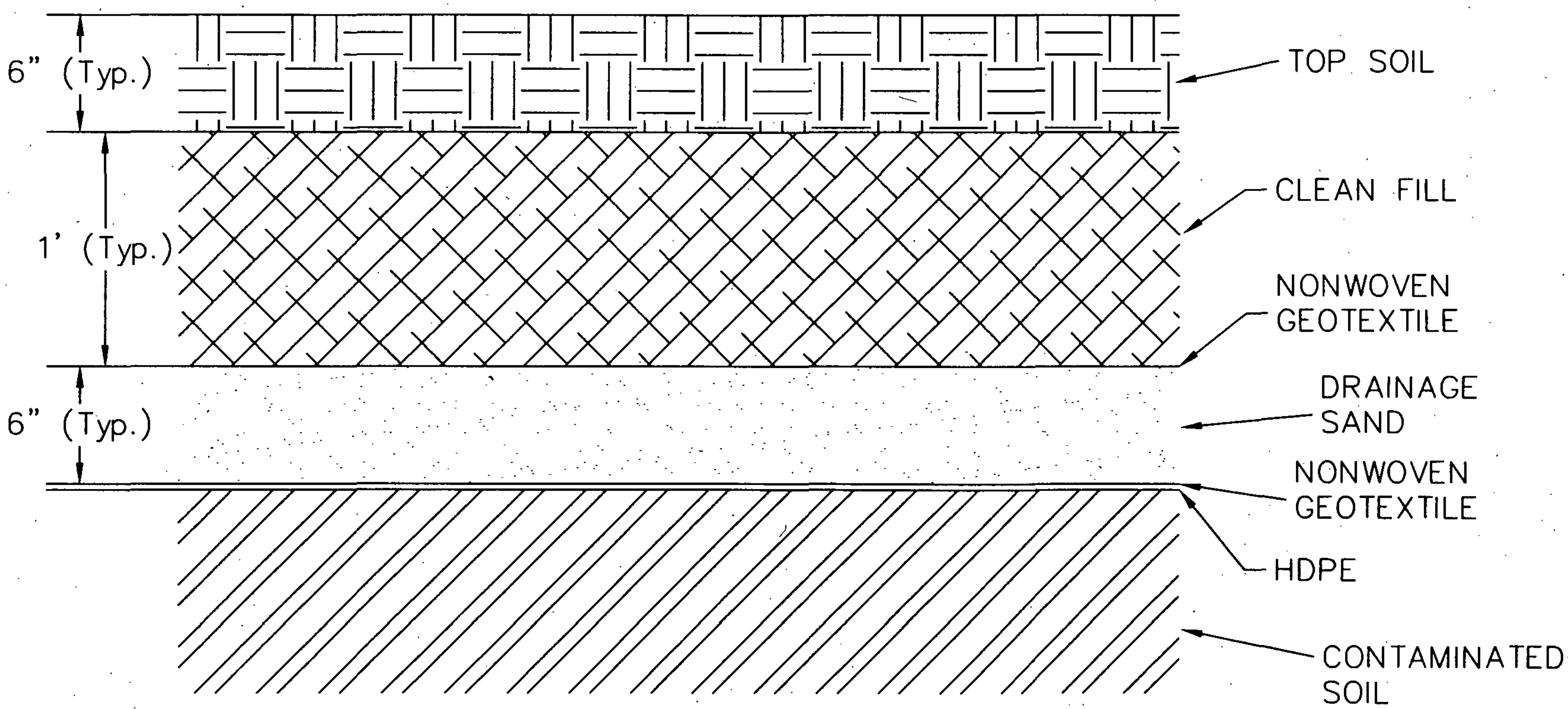
400258



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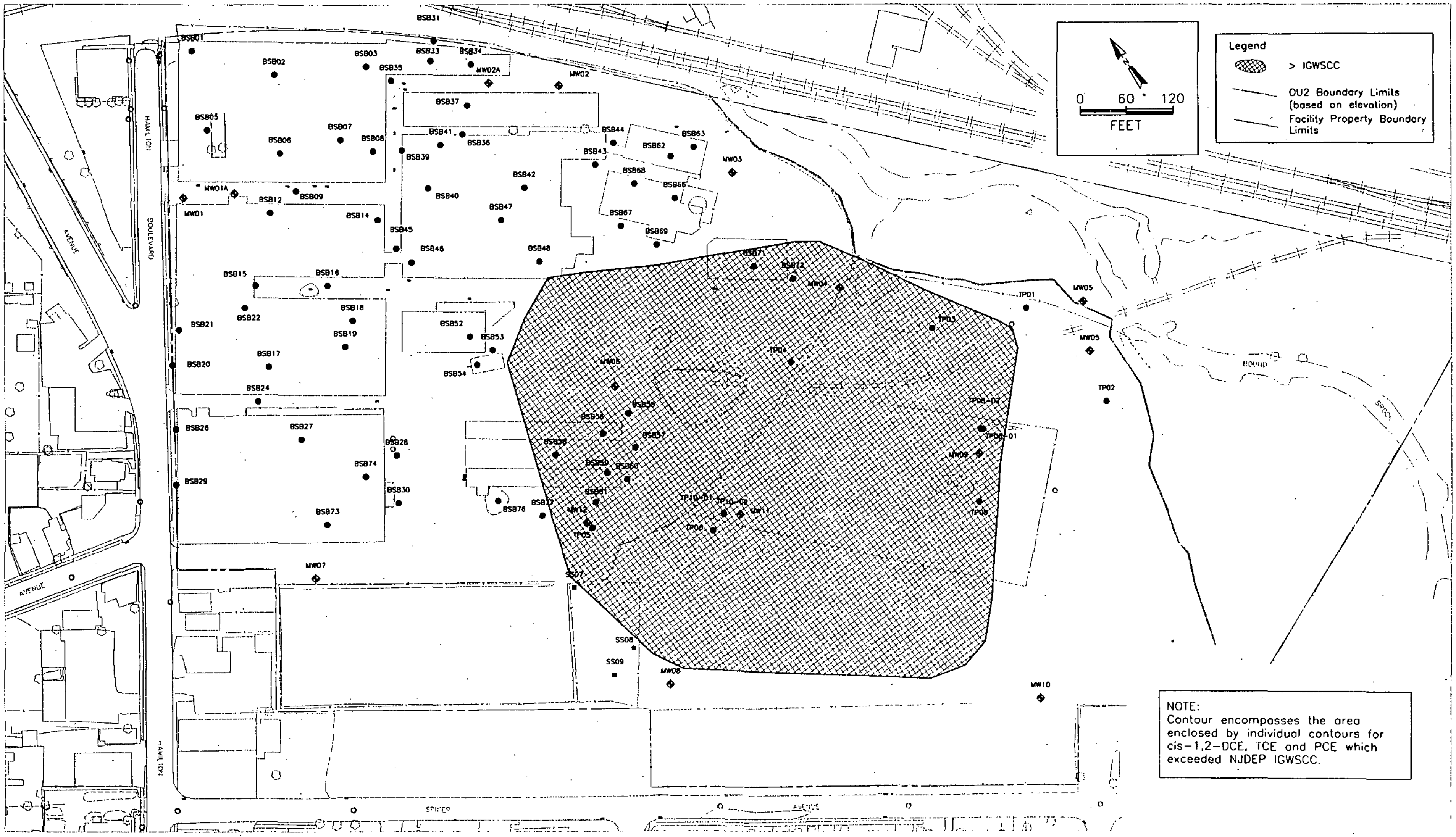

400259

TETRA TECH FW, INC.	TITLE: Alternative S-4; Extent of VOCs > IGWSCC Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN.: LEN CHKD: BMS DES.: LEN	DATE: 03/29/04 REV.: 1 APPD: RC	PROJECT NO.: 1945.2118 FIGURE NO.: 4-4

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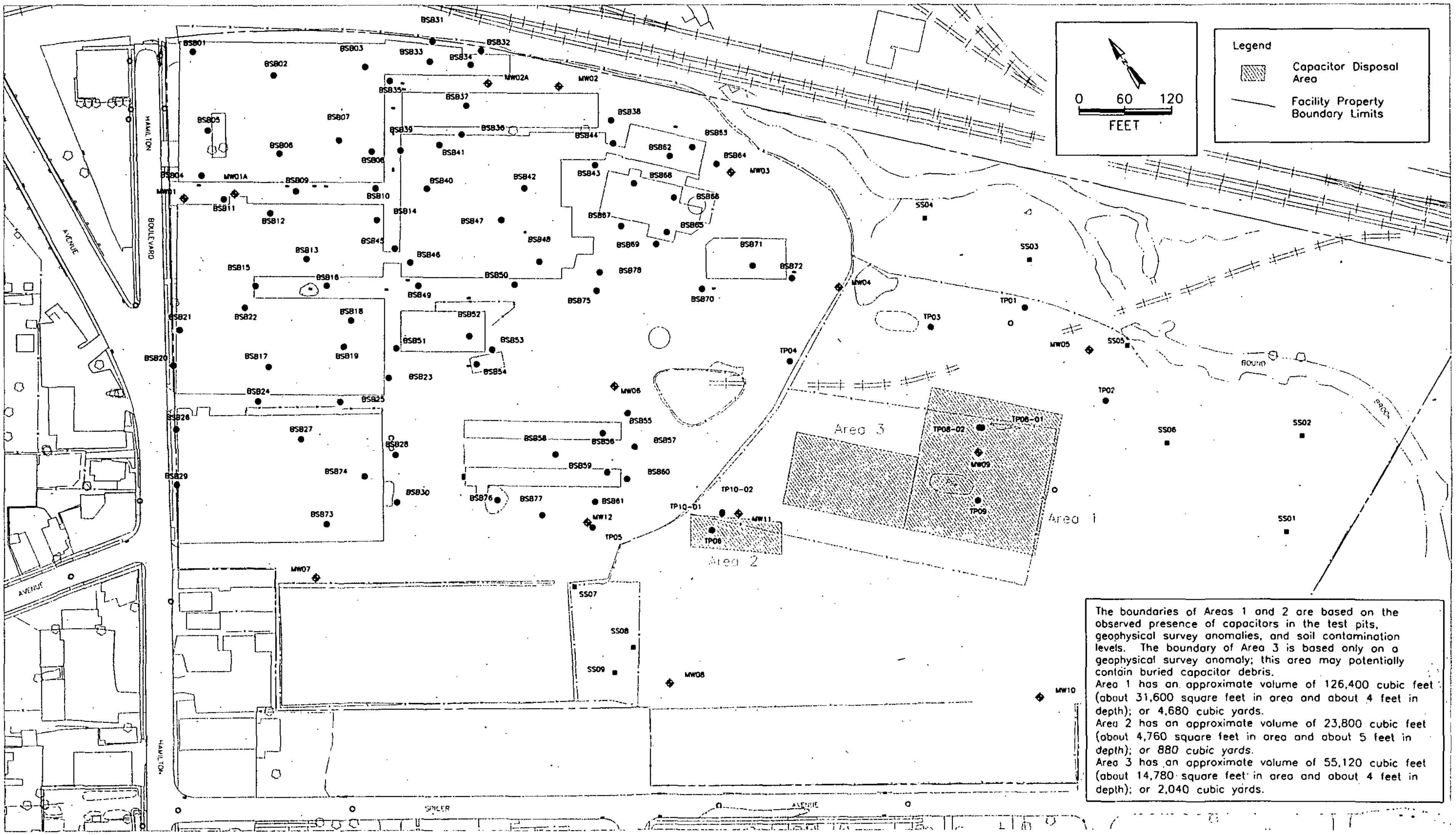

400260

TETRA TECH FW, INC.	TITLE: Areas of Potentially Buried Capacitor Debris Cornell-Dubilier Electronics Superfund Site Facility Soils and Buildings FS Report	DWN.: LEN CHKD: BMS DES.: LEN	DATE: 03/29/04 REV.: 1 APPD: RC	PROJECT NO.: 1945.2118 FIGURE NO.: 4-5

SECTION 5.0

5.0 REFERENCES

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SECTION 6.0

6.0 GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
C	Celsius
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Chemical of Potential Concern
CT	Central Tendency
DAF	Dilution Attenuation Factor
DRE	Destruction and Removal Efficiency
DUA	Dunellen-Urban Land Complex
DvA	Dunellen Variant Sandy Loam
DWA	Dunellen Variant-Urban Land Complex
EMI	Electromagnetic Induction
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESA	Ellington Variant-Urban Land Complex
F	Fahrenheit
FS	Feasibility Study
GAC	Granular Activated Carbon
GRA	General Response Action
HEPA	High Efficiency Particulate Air
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
IGWSCC	Impact to Groundwater Soil Cleanup Criteria
ISV	In Situ Vitrification
KWB	Klinesville-Urban Land Complex
LDR	Land Disposal Restriction
LOAEL	Lowest Observed Adverse Effect Level
LTTD	Low Temperature Thermal Desorption
MCL	Maximum Contaminant Levels
MEK	methyl ethyl ketone
mg/kg	Milligrams Per Kilogram
MIBK	methyl isobutyl ketone
mph	miles per hour
MSL	mean sea level
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollution Discharge Elimination System
NOAEL	No Observed Adverse Effect Level
NRHP	National Register of Historical Places
O&M	Operation and Maintenance
OU	Operable Unit
Pa	Parsippany silt loam
PCBs	Polychlorinated Biphenyls
PPE	Personal Protective Equipment

PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
ReA	Reaville silt loam
RFA	Reaville-Urban Land Complex
RI	Remedial Investigation
ROD	Record of Decision
ROW	Right-of-way
RME	Reasonable Maximum Exposure
SARA	Superfund Amendments and Reauthorization Act
SLERA	Screening Level Ecological Risk Assessment
SSL	Soil Screening Level
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TCE	Trichloroethene
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

APPENDIX A

400267

APPENDIX A

MAJOR CONSTRUCTION COMPONENTS

TABLE A-1

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-1: NO ACTION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
No Remedial Action			

400269

TABLE A-2

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-2: EXCAVATION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

	ESTIMATED	UNITS	DESCRIPTION
I. EXCAVATION			
1. Clearing and Grubbing	8.4	acre	Assume minor clearing and grubbing with some trees in undeveloped area.
2. Excavation	272,000	cy	Excavate soils where PCBs > 10 ppm or other COPCs > IGWSCC. Estimated quantity is in-place soil volume.
3. Clean Fill	340,000	cy	Clean soil for into excavated areas. Estimated volume includes 25% fluff.
4. Topsoil	31,000	cy	Layer of 0.5 ft topsoil for vegetation.
5. Compaction	272,000	cy	Mechanical compaction of clean fill and topsoil.
6. Vegetation	18.1	acre	Hydro-seeding
II. ENGINEERED CONTROL			
1. Excavation	6500	cy	Excavate surface soils where PCBs are between 2 and 10 ppm. Estimated quantity is in-place soil volume.
2. Clean Fill	8,100	cy	Clean soil fill for 2 ppm <PCB <10 ppm areas. Estimated volume includes 25% fluff.
3. Topsoil	4,100	cy	Layer of 0.5 ft. topsoil to support vegetation.
4. Compaction	6,500	cy	Mechanical compaction of clean fill and topsoil.
5. Vegetation	2.0	acre	Hydro-seeding of engineered control area.

400270

TABLE A-2

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-2: EXCAVATION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
III. OFF-SITE DISPOSAL			
• TSCA Waste	200,000	ton	Transport and dispose in an approved off-site permitted treatment, storage, and disposal facility (TSDF) as TSCA waste. Assumes PCB contaminated soil > 50 ppm (TSCA waste) can be segregated.
- Requiring Treatment	65,000	ton	Estimated volume of soil contaminated with lead, which would require treatment prior to disposal.
• Non-TSCA Waste	100,000	ton	Transport and dispose in an approved off-site permitted TSDF as non-TSCA waste.
- Requiring Treatment	32,000	ton	Estimated volume of soil contaminated with lead, which would require treatment prior to disposal.
• Waste from Capacitor Disposal Area	10,400	ton	Transport and dispose of material excavated from Capacitor Disposal Area by an approved IDW subcontractor.
- Requiring Treatment	600	ton	Estimated volume of material contaminated with lead, which would require treatment prior to disposal. Assume to be TSCA material.

400271

TABLE A-3

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-3: "PRINCIPAL THREAT" EXCAVATION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
I. EXCAVATION			
1. Clearing and Grubbing	8.4	acres	Assume minor clearing and grubbing with some trees in undeveloped area.
2. Excavation	107,000	cy	Excavate soils where PCBs > 500 ppm. Estimated quantity is in-place soil volume.
3. Clean Fill	134,000	cy	Clean soil fill into excavated areas. Estimated volume includes 25% fluff.
4. Compaction	107,000	cy	Mechanical compaction of clean fill and topsoil.
II. MULTI-LAYER CAP			
1. Topsoil	16,000	cy	Minimum of 0.5 ft topsoil for vegetation.
2. Clean Fill	31,000	cy	One (1) ft of clean fill to overlay cap system and support vegetation.
3. Drainage Sand	16,000	cy	Drainage layer of 0.5 ft to support multi-layer cap system.
4. Compaction	63,000	cy	Mechanical compaction of drainage layer, clean fill, and topsoil to support multi-layer cap system.
5. Geotextile	2,000,000	sf	Two (2) layers of non-woven geotextile to support multi-layer cap system.

TABLE A-3
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-3: "PRINCIPAL THREAT" EXCAVATION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES		UNITS
6. HDPE Liner	1,000,000	sf	One (1) layer of HDPE liner to support multi-layer cap system.
7. Vegetation	19.4	acre	Hydro-seeding to support vegetation.
III. ENGINEERED CONTROL			
1. Excavation	2,300	cy	Excavate surface soils where PCBs are between 2 and 10 ppm. Estimated quantity is in-place soil volume.
2. Clean Fill	2,900	cy	Clean soil fill for 2 ppm < PCB <10 ppm area. Estimated volume includes 25% fluff.
3. Topsoil	1,400	cy	Layer of 0.5 ft. topsoil to support vegetation.
4. Compaction	2,300	cy	Mechanical compaction of clean fill and topsoil.
5. Vegetation	0.7	acre	Hydro-seeding of engineered control area.
IV. OFF-SITE DISPOSAL			
• TSCA Waste (>50 ppm)	112,000	ton	Transport and dispose of in an approved off-site permitted treatment, storage, and disposal facility (TSDF) as TSCA waste.
- Requiring Treatment	38,000	ton	Estimated volume of soil contaminated with lead, which would require treatment prior to disposal.
• Waste from Capacitor Disposal Area	10400	ton	Transport and dispose of material excavated from capacitor Disposal Area in an approved TSDF.
- Requiring Treatment	600	ton	Estimated volume of material contaminated with lead, which would require treatment prior to disposal. Also assumed to be TSCA material.

400273

TABLE A-4

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-4: SOIL VAPOR EXTRACTION/SOLIDIFICATION AND WITH MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
I. MULTI-LAYER CAP			
1. Clearing and Grubbing	8.4	acre	Assume minor clearing and grubbing with some trees in undeveloped area.
2. Topsoil	16,000	cy	Minimum of 0.5 ft. for vegetation.
3. Clean Fill	31,000	cy	One (1) ft. of clean fill to overlay cap system and support vegetation.
4. Drainage Sand	16,000	cy	Drainage layer of 0.5 ft to support multi-layer cap system.
5. Compaction	63,000	cy	Mechanical compaction of drainage layer, clean fill, and topsoil to support multi-layer cap system.
6. Geotextile	2,000,000	sf	Two (2) layers of non-woven geotextile to support multi-layer cap system.
7. HDPE Liner	1,000,000	sf	One (1) layer of HDPE liner to support multi-layer cap system.
8. Vegetation	19.4	acre	Hydro-seeding to support vegetation over site (excluding wetlands area).
II. CAPACITOR DISPOSAL AREA			
1. Excavation	7,500	cy	Excavate material from Capacitor Disposal Area. Estimated quantity is in-place soil volume.
2. Clean Fill	9,375	cy	Clean fill for excavated area.
3. Compaction	7,500	cy	Mechanical compaction of fill.

400274

TABLE A-4
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-4: SOIL VAPOR EXTRACTION AND SOLIDIFICATION AND WITH MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
III. ENGINEERED CONTROL			
1. Excavation	2,300	cy	Excavate surface soils where PCBs are between 2 and 10 ppm. Estimated quantity is in-place soil volume.
2. Clean Fill	2,900	cy	Clean soil fill. Estimated volume includes 25% fluff.
3. Topsoil	1,400	cy	Layer of 0.5 ft. topsoil to support vegetation.
4. Compaction	2,300	cy	Mechanical compaction of clean fill and topsoil.
5. Vegetation	0.7	acre	Hydro-seeding of engineered control area.
IV SOLIDIFICATION			
1. Portland Cement	24,000	ton	Cement material required for solidification.
2. Equipment	12	mo	Equipment required to apply cement (*i.e.*, cement mixer, grouting equipment, etc.).
3. Operational Labor	2,080	hr	Operational labor costs.
4. Equipment Maintenance	1	yr	Maintenance cost for equipment.
5. Monitoring Program	2	yr	Program to monitor groundwater to verify soil solidification
V. SOIL VAPOR EXTRACTION			
Well Installation			
1. Drilling (8" HSA)	2310	LF	Drill 150 wells to depths approximately 14 ft. Estimated quantity includes 10% extra for wastage.
2. Casing (4" PVC)	1650	LF	Casing for 150 wells.
3. Well Screen (4" Dia)	660	LF	Four (4) ft. screens for wells.

400275

TABLE A-4

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-4: SOIL VAPOR EXTRACTION AND SOLIDIFICATION AND WITH MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
SVE System			
1. Equipment and Installation	1	ea	Includes poly liner, SVE blowers, moisture separators, and carbon units (2 per year).
2. Equipment Maint.	4	yr	Maintenance of SVE equipment for 4 years.
3. Operational Labor	1460	day	Operational labor for 4 years.
4. Power	48	mo	Power requirements for 4 years.
VI. OFF-SITE DISPOSAL			
• Waste from Capacitor Disposal Area	10,400	ton	Transport and dispose of material excavated from capacitor Disposal Area in an approved TSDF.
- Requiring Treatment	600	ton	Estimated volume of material contaminated with leads which would require treatment prior to disposal. Assumed to be TSCA material.

400276

TABLE A-5

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-5: LOW TEMPERATURE THERMAL DESORPTION/MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
I. MULTI-LAYER CAP			
1. Clearing and Grubbing	8.4	acre	Assume minor clearing and grubbing with some trees in undeveloped area.
2. Topsoil	16,000	cy	Minimum of 0.5 ft. for vegetation.
3. Clean Fill	31,000	cy	One (1) ft. of clean fill to overlay cap system and support vegetation.
4. Drainage Sand	16,000	cy	Drainage layer of 0.5 ft to support multi-layer cap system.
5. Compaction	63,000	cy	Mechanical compaction of drainage layer, clean fill, and topsoil to support multi-layer cap system.
6. Geotextile	2,000,000	sf	Two (2) layers of non-woven geotextile to support multi-layer cap system.
7. HDPE Liner	1,000,000	sf	One (1) layer of HDPE liner to support multi-layer cap system.
8. Vegetation	19.4	acre	Hydro-seeding to support vegetation over site (excluding wetlands area).
II. CAPACITOR DISPOSAL AREA			
1. Excavation	7,500	cy	Excavate material from Capacitor Disposal Area. Estimated quantity is in-place soil volume.
2. Clean Fill	9,375	cy	Clean fill for excavated area. Estimated volume includes 25% fluff.
3. Compaction	7,500	ton	Mechanical compaction of fill.

400277

TABLE A-5

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-6: LOW TEMPERATURE THERMAL DESORPTION/MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
III. Off-site Disposal			
• Non-TSCA Waste	16,500	ton	Transport and dispose of debris in an approved off-site permitted TSDF as non-hazardous waste.
• Waste from Capacitor Disposal Area	10,400	ton	Transport and dispose of material excavated from Capacitor Disposal Area by an approved IDW subcontractor.
- Requiring Treatment	600	ton	Estimated volume of material contaminated with lead, which would require treatment prior to disposal. Assume to be TSCA material.
IV. LTDD			
1. Mobilization/Demobilization	2	ea	Mobilization and demobilization of equipment and personnel required for the LTTD unit.
2. Permitting/Engineering for site	1	ea	Obtain required permits and design system.
3. Excavation	107,000	cy	Excavation of soils requiring treatment.
4. Debris Segregation	11,000	cy	Segregate debris (*e.g.*, metal, concrete, etc.)
5. Indirect Fire, Rental and Operation	161,000	ton	Thermal desorption of excavated soils.
6. Equipment Maintenance (8% of capital cost)	4.5	yr	Maintenance cost of LTTD equipment.

400278

TABLE A-5

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-6: LOW TEMPERATURE THERMAL DESORPTION/MULTI-LAYER CAP
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
V. ENGINEERED CONTROL			
1. Excavation	2,300	cy	Excavate surface soils where PCBs are between 2 and 10 ppm. Estimated quantity is in-place soil volume.
2. Clean Fill	2,900	cy	Clean soil fill for 2 ppm < PCB <10 ppm area. Estimated volume includes 25% fluff.
3. Topsoil	1,400	cy	Layer of 0.5 ft. topsoil to support vegetation.
4. Compaction	2,300	cy	Mechanical compaction of fill and topsoil.
5. Vegetation	0.7	acre	Hydro-seeding of engineered control area.

400279

TABLE A-6

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE B-1: NO ACTION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
No Remedial Action			

400280

TABLE A-7

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE B-2: DECONTAMINATION AND SURFACE ENCAPSULATION
MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	UNITS	DESCRIPTION
VI. DECONTAMINATION			
1. Floor	242,000	sf	Removal of visible dust from floors
2. Ceiling/Walls	503,639	sf	Removal of visible dust from ceilings and walls
II. ENCAPSULATION			
1. Floor	242,000	sf	Sealing of floors with epoxy
2. Ceiling/Walls	503,639	sf	Sealing of ceilings/walls with epoxy
III. RELOCATION			
1. Tenants	18	ea	Estimate of number of tenants that may be eligible for relocation

400281

TABLE A-8 [1]

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

ALTERNATIVE B-3: BUILDING DEMOLITION

MAJOR FACILITIES AND CONSTRUCTION COMPONENTS

Building Dimensions (LxWxH) [2,3]	UNIT	1 (includes 1, 1A, 1B, and 1C) 260' x 180' x 18'	2 (includes 2 and 2A) 100' x 110' x 18' (bldg 2) 165' x 95' x20' (bldg 2A)	3 & 4 (includes 4 and 4A) 100' x 140' x 50' (bldg 3) 80' x 125' x 20' (bldg 4) 80' x 125' x 12' (bldg 4A)	5 (includes 5 and 5A) 260' x 165' x 25'	6 100' x 40' x 20'	7 60' x 25' x 20'	8 250' x 50' x16'	9 (includes 9, 9A, 9B, and 9C) 220' x 180' x 20'	10 110' x 55' x 30'	11 and 12 (Quonset Huts) 200' x 25' x 20' ea	13 100' x 45' x 15'	14 102' x 51' x 30'	15 40' x 70' x 18'	16 66' x 56' x 30'	17 30' x 30' x 15'	18 25' x 35' x 16'
Remove concrete slab on grade (<8')	SF	46,800	26,675	34,000	42,900	4,000	1,500	12,500	39,600	6,050	10,000	4,500	5,200	2,800	3,700	900	875
Remove carpeting	SF	2,000	5,500	3,000	500	1,600			2,000								
Remove wood floor	SF													2,800			
Remove roof (built up)	SF	46,800	26,675	34,000	42,900		1,500	4,000	39,600			5,200		2,800	3,700	900	875
Remove concrete roof	SF					*4,000*											
Remove misc. roof (i.e., vent, louver, etc.)	EA	10	8	10	10	4	4	4	10	2	2	4	2	2	4	2	2
Remove concrete beams	CF					400						24					
Remove concrete support	CF													624			
Remove concrete columns	CF											2,160					
Remove steel beams and columns	TON	254	31	32	48	11		15	51	2				12	20		
Remove masonry wall (12")	SF	25,200	16,800	20,200	15,400	5,600		9,600	25,600			3,250		5,100	5,525	1,800	2,000
Remove interior walls	SF										1,500	2,250	1,020				
Remove panel/sheet rock	SF	4,800	5,400	3,200	200	960			2,400	1,500							
Remove wood wall	SF			3,420	6,800		3,400			6,600				1,000	1,000		
Remove exterior wood wall	SF												6,700				
Remove exterior siding													6,700				
Remove wood roof truss structure	SF			10,000			1,500			6,050			5,200				
Remove metal roof	SF									6,050	34,800						
Remove piping to 4"	LF	10,000	10,000	5,000	1,000	500	400	500	10,000	500	1,500	6,000	6,000	6,000	2,000	100	100
Remove piping to 8"	LF	1,000	1,000	500	200	100	100	100	1,000					1,000	500	50	50
Remove piping to 16"	LF													70			
Remove lavatory/urinal	EA	8	4	6	4	4	2	4	8	4	4	2	2	2	2	2	2
Remove misc. fixtures	EA	10	8	10	8	8	4	8	10	4	5	5	5	5	5	2	2
Remove electrical conduits	LF	5,000	5,000	5,000	3,000	1,000	500	1,000	5,000	6,000	6,000	6,000	6,000	2,000	1,000	200	200
Remove duct < 2 ft.	LF	800	800	1,000	1,000	500	300	500	800	800	800	200	200	200	200	100	100
Remove duct > 2 ft.	LF	400	400	500	500	100	100	100	400	400	400	100	100	100	100	25	25
Select backfill	CY													1,000			
T&D of non-hazardous material	TON	2,720	1,800	3,600	3,600	270	90	720	3,150	675	720	270	450	360	450	90	90
T&D of hazardous material	TON	680	200	400	400	30	10	80	350	75	80	30	50	40	50	10	10

Notes:

1. *The major facilities and construction components listed in this table were based on "best estimates" obtained during a field reconnaissance on February 11, 2003. Estimated that 18 tenants may be eligible for relocation.*
2. Building dimensions obtained from Figure 1-2, "Facility Property Map" from "Final Remedial Investigation Report for OU-2," December 2002.
3. Building heights are estimated and were obtained by visual inspection during the field reconnaissance.

APPENDIX B

400283

APPENDIX B

CONCEPTUAL COST ESTIMATES

TABLE B-1
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-1: NO ACTION
COST ESTIMATE

	Estimated Quantities	Units	Labor		Equipment		Material		Total Construction Costs
			Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	
No Action			$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
								Total Present Worth	**$0.00**

400285

TABLE B-2
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-2: EXCAVATION
COST ESTIMATE

	Estimated Quantities	Units	Labor Unit Price	Labor Cost	Equipment Unit Price	Equipment Cost	Material Unit Price	Material Cost	Total Construction Costs
Excavation									
Clearing and Grubbing	8.4	acre	$208.52	$1,751.57	$412.51	$3,465.08	$0.00	$0.00	$5,216.65
Excavation	272000	cu yd	$1.83	$497,760.00	$3.51	$954,720.00	$0.00	$0.00	$1,452,480.00
Clean Fill	340000	cu yd	$4.00	$1,360,000.00	$3.04	$1,033,600.00	$17.23	$5,858,200.00	$8,251,800.00
Topsoil	31000	cu yd	$3.91	$121,210.00	$3.01	$93,310.00	$23.25	$720,750.00	*$935,270.00*
Compaction	272000	cu yd	$0.91	$247,520.00	$0.25	$68,000.00	$0.00	$0.00	$315,520.00
Vegetation	18.1	acre	$75.00	$1,357.50	$100.00	$1,810.00	$1,500.00	$27,150.00	*$30,317.50*
Engineered Control									
Excavation	6500	cu yd	$1.83	$11,895.00	$3.51	$22,815.00	$0.00	$0.00	$34,710.00
Clean Fill	8100	cu yd	$4.00	$32,400.00	$3.04	$24,624.00	$17.23	$139,563.00	*$196,587.00*
Top Soil	4100	cu yd	$3.91	$16,031.00	$3.01	$12,341.00	$23.25	$95,325.00	*$123,697.00*
Compaction	6500	cu yd	$0.91	$5,915.00	$0.25	$1,625.00	$0.00	$0.00	$7,540.00
Vegetation	2.0	acre	$75.00	$150.00	$100.00	$200.00	$1,500.00	$3,000.00	*$3,350.00*
Off-site Disposal									
TSCA Waste	200000	ton	$0.00	$0.00	$0.00	$0.00	$157.00	$31,400,000.00	$31,400,000.00
- Requiring Treatment	65000	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$14,300,000.00	$14,300,000.00
Non-TSCA Waste	100000	ton	$0.00	$0.00	$0.00	$0.00	$70.00	$7,000,000.00	$7,000,000.00
- Requiring Treatment	32000	ton	$0.00	$0.00	$0.00	$0.00	$155.00	$4,960,000.00	$4,960,000.00
Capacitor Disposal Area	10400	ton	$0.00	$0.00	$0.00	$0.00	$270.00	$2,808,000.00	$2,808,000.00
- Requiring Treatment	600	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$132,000.00	$132,000.00

Total Direct Construction Costs (TDCC)	$71,956,488.15
Area Code 07080 Factor at 10%	$7,195,648.82
TDCC Subtotal	$79,152,136.97
Contingency at 20% of TDCC Subtotal	$15,830,427.39
Engineering and Construction Management @ 15% of TDCC Subtotal	$11,872,820.55
Legal and Administrative @ 5% of TDCC Subtotal	$3,957,606.85
Total Construction Cost	$110,812,991.75
Maintenance (8% Capital Cost)	*$103,137.72*
20% Contingency	$20,627.54
Annual O&M	$123,765.26
30 years	
1% discount rate	
Present Worth Total Maintenance Cost	$3,194,097.82
Total Present Worth	**$114,007,089.58**

Does not include demolition and/or asphalt removal costs.
Does not include utility relocation costs.
Does not include hauling costs for on-site soil handling.
Assumes only minor clearing and grubbing with some trees in undeveloped area.
Excavation quantity is based on in-place soil volume.
Excavation volume includes capacitor disposal area.
Clean fill for excavation and engineered control includes 25% extra for fluff.
Assumes that PCB contaminated soil > 50 ppm can be segregated (TSCA waste).
Requiring Treatment' assumes RCRA code exceedance for lead.
Off-site disposal costs include T&D only.
Engineered control to provide protection from direct contact from 2 ppm < PCBs < 10 ppm.
Maintenance costs are 8% of capital costs. Capital costs for items requiring maintenance are identified in *italics*.

400286

TABLE B-3
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-3: "PRINCIPAL THREAT" EXCAVATION
COST ESTIMATE

			Labor		Equipment		Material		
	Estimated Quantities	Units	Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	Total Construction Costs
Excavation									
Clearing and Grubbing	8.4	acre	$208.52	$1,751.57	$412.51	$3,465.08	$0.00	$0.00	$5,216.65
Excavation	107000	cu yd	$1.83	$195,810.00	$3.51	$375,570.00	$0.00	$0.00	$571,380.00
Clean Fill	134000	cu yd	$4.00	$536,000.00	$3.04	$407,360.00	$17.23	$2,308,820.00	$3,252,180.00
Compaction	107000	cu yd	$0.91	$97,370.00	$0.25	$26,750.00	$0.00	$0.00	$124,120.00
Multi-Layer Cap									
Top Soil (6")	16000	cu yd	$2.95	$47,200.00	$2.21	$35,360.00	$23.25	$372,000.00	*$454,560.00*
Clean Fill (12")	31000	cu yd	$4.00	$124,000.00	$3.50	$108,500.00	$17.23	$534,130.00	*$766,630.00*
Drainage Sand (6")	16000	cu yd	$4.00	$64,000.00	$3.50	$56,000.00	$17.55	$280,800.00	*$400,800.00*
Compaction (24")	63000	cu yd	$0.91	$57,330.00	$0.25	$15,750.00	$0.00	$0.00	*$73,080.00*
Geotextile (2 layer)	2000000	sq ft	$0.50	$1,000,000.00	$0.00	$0.00	$0.35	$700,000.00	*$1,700,000.00*
HDPE Liner	1000000	sq ft	$0.25	$250,000.00	$0.00	$0.00	$0.75	$750,000.00	*$1,000,000.00*
Vegetation	19.4	acre	$75.00	$1,455.00	$100.00	$1,940.00	$1,500.00	$29,100.00	*$32,495.00*
Engineered Control									
Excavation	2300	cu yd	$1.83	$4,209.00	$3.51	$8,073.00	$0.00	$0.00	$12,282.00
Clean Fill	2900	cu yd	$4.00	$11,600.00	$3.04	$8,816.00	$17.23	$49,967.00	*$70,383.00*
Top Soil	1400	cu yd	$3.91	$5,474.00	$3.01	$4,214.00	$23.25	$32,550.00	*$42,238.00*
Compaction	2300	cu yd	$0.91	$2,093.00	$0.25	$575.00	$0.00	$0.00	$2,668.00
Vegetation	0.7	acre	$75.00	$52.50	$100.00	$70.00	$1,500.00	$1,050.00	*$1,172.50*
Off-site Disposal									
TSCA Waste	112000	ton	$0.00	$0.00	$0.00	$0.00	$157.00	$17,584,000.00	$17,584,000.00
- Requiring Treatment	38000	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$8,360,000.00	$8,360,000.00
Non-TSCA Waste	0	ton	$0.00	$0.00	$0.00	$0.00	$70.00	$0.00	$0.00
- Requiring Treatment	0	ton	$0.00	$0.00	$0.00	$0.00	$155.00	$0.00	$0.00
Capacitor Disposal Area	10400	ton	$0.00	$0.00	$0.00	$0.00	$270.00	$2,808,000.00	$2,808,000.00
- Requiring Treatment	600	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$132,000.00	$132,000.00

Total Direct Construction Costs (TDCC)	$37,393,205.15
Area Code 07080 Factor at 10%	$3,739,320.52
TDCC Subtotal	$41,132,525.67
Contingency at 20% of TDCC Subtotal	$8,226,505.13
Engineering and Construction Management @ 15% of TDCC Subtotal	$6,169,878.85
Legal and Administrative @ 5% of TDCC Subtotal	$2,056,626.28
Total Construction Cost	$57,585,535.93
Maintenance (8% Capital Cost)	$467,998.70
20% Contingency	$93,599.74
Annual O&M	$561,598.44
30 years	
1% discount rate	
Present Worth Total Maintenance Cost	$14,493,568.68
Total Present Worth	$72,079,104.61

Does not include demolition and/or asphalt removal costs.
Does not include utility relocation costs.
Assumes only minor clearing and grubbing with some trees in undeveloped area.
Excavation quantity is based on in-place soil volume.
Excavation volume includes capacitor disposal area.
Clean fill for excavation and engineered control includes 25% extra for fluff.
Assumes that PCB contaminated soil > 50 ppm can be segregated (TSCA waste).
Off-site disposal costs include T&D only.
Engineered control to provide protection from direct contact from 2 ppm < PCBs < 10 ppm.
Maintenance costs are 8% of capital costs. Capital costs for maintenance are identified in *italics*.
Geotextile assumed 40mil.
A 15% wastage is assumed on multi-layer cap materials (geotextile, HDPE).

400287

TABLE B-4
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-4: SOLIDIFICATION AND SVE WITH MULTI-LAYER CAP
COST ESTIMATE

	Estimated Quantities	Units	Labor Unit Price	Labor Cost	Equipment Unit Price	Equipment Cost	Material Unit Price	Material Cost	Total Construction Costs
Multi-Layer Cap									
Clearing and Grubbing	8.4	acre	$208.52	$1,751.57	$412.51	$3,465.08	$0.00	$0.00	$5,216.65
Top Soil (6")	16000	cu yd	$2.95	$47,200.00	$2.21	$35,360.00	$23.25	$372,000.00	*$454,560.00*
Clean Fill (12")	31000	cu yd	$4.00	$124,000.00	$3.50	$108,500.00	$17.23	$534,130.00	*$766,630.00*
Drainage Sand (6")	16000	cu yd	$4.00	$64,000.00	$3.50	$56,000.00	$17.55	$280,800.00	$400,800.00
Compaction (24")	63000	cu yd	*$0.91*	*$57,330.00*	*$0.25*	*$15,750.00*	*$0.00*	*$0.00*	*$73,080.00*
Geotextile (2 layer)	2000000	sq ft	$0.50	$1,000,000.00	$0.00	$0.00	$0.35	$700,000.00	*$1,700,000.00*
HDPE Liner	1000000	sq ft	$0.25	$250,000.00	$0.00	$0.00	$0.75	$750,000.00	*$1,000,000.00*
Vegetation	19.4	acre	$75.00	$1,455.00	$100.00	$1,940.00	$1,500.00	$29,100.00	*$32,495.00*
Capacitor Disposal Area									
Excavation	7500	cu yd	$1.83	$13,725.00	$3.51	$26,325.00	$0.00	$0.00	$40,050.00
Clean Fill	9375	cu yd	$4.00	$37,500.00	$3.04	$28,500.00	$17.23	$161,531.25	$227,531.25
Compaction	7500	cu yd	$0.91	$6,825.00	$0.25	$1,875.00	$0.00	$0.00	$8,700.00
Engineered Control									
Excavation	2300	cu yd	$1.83	$4,209.00	$3.51	$8,073.00	$0.00	$0.00	$12,282.00
Clean Fill	2900	cu yd	$4.00	$11,600.00	$3.04	$8,816.00	$17.23	$49,967.00	*$70,383.00*
Top Soil	1400	cu yd	$3.91	$5,474.00	$3.01	$4,214.00	$23.25	$32,550.00	*$42,238.00*
Compaction	2300	cu yd	$0.91	$2,093.00	$0.25	$575.00	$0.00	$0.00	$2,668.00
Vegetation	0.7	acre	$75.00	$52.50	$100.00	$70.00	$1,500.00	$1,050.00	*$1,172.50*
Solidification									
Portland Cement (Bulk)	24000	ton	$0.00	$0.00	$0.00	$0.00	$105.00	$2,520,000.00	$2,520,000.00
Equipment Cost	12	mo	$0.00	$0.00	$38,342.00	$460,104.00	$0.00	$0.00	$460,104.00
Operational Labor	2080	hr	$347.37	$722,529.60	$0.00	$0.00	$0.00	$0.00	$722,529.60
Equipment Maintenance	1	yr	$4,815.00	$4,815.00	$1,250.00	$1,250.00	$747.00	$747.00	[redacted]
Monitoring Program	2	yr	$1,200.00	$2,400.00	$1,000.00	$2,000.00	$500.00	$1,000.00	*$5,400.00*
Well Installation for SVE									
Drilling (8" HSA)	2310	LF	$6.14	$14,183.40	$18.75	$43,312.50	$0.00	$0.00	$57,495.90
Casing (4" PVC)	1650	LF	$3.36	$5,544.00	$10.26	$16,929.00	$2.57	$4,240.50	$26,713.50
Well Screen (4" dia)	660	LF	$3.36	$2,217.60	$10.26	$6,771.60	$26.42	$17,437.20	$26,426.40
SVE System									
Equipment Cost & Installation	1	ea	$292,000.00	$292,000.00	$928,000.00	$928,000.00	$140,000.00	$140,000.00	$1,360,000.00
Equip. Maint. (8% of SVE capital cost)	4	yr	$0.00	$0.00	$80,000.00	$320,000.00	$0.00	$0.00	[redacted]
Operational Labor	1460	day	$699.94	$1,021,912.40	$78.50	$114,610.00	$0.00	$0.00	$1,136,522.40
Power	*48*	*mo*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$39,420.00*	$1,892,160.00	$1,892,160.00
Off-site Disposal									
TSCA Waste	0	ton	$0.00	$0.00	$0.00	$0.00	$157.00	$0.00	$0.00
- Requiring Treatment	0	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$0.00	$0.00
Non-TSCA Waste	0	ton	$0.00	$0.00	$0.00	$0.00	$70.00	$0.00	$0.00
- Requiring Treatment	0	ton	$0.00	$0.00	$0.00	$0.00	$155.00	$0.00	$0.00
Capacitor Disposal Area	10400	ton	$0.00	$0.00	$0.00	$0.00	$270.00	$2,808,000.00	$2,808,000.00
- Requiring Treatment	600	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$132,000.00	$132,000.00

Total Direct Construction Costs (TDCC)	$15,979,758.20
Area Code 07080 Factor at 10%	$1,597,975.82
TDCC Subtotal	$17,577,734.02
Contingency at 20% of TDCC Subtotal	$3,515,546.80
Engineering and Construction Management @ 15% of TDCC Subtotal	$2,636,660.10
Legal and Administrative @ 5% of TDCC Subtotal	$878,886.70
Total Construction Cost	$24,608,827.63

Equipment Maintenance	[redacted]
Maintenance (8% Capital Cost)	*$363,740.68*
20% Contingency	$72,748.14
Annual O&M	$436,488.82
30 years	
1% discount rate	
Present Worth Total Maintenance Cost	$11,264,776.01
Total Present Worth	$36,200,415.64

Does not include demolition and/or asphalt removal costs.
Does not include utility relocation costs.
Assumes only minor clearing and grubbing with some trees in undeveloped area.
Excavation quantity is based on in-place soil volume.
Clean fill includes 25% extra for fluff.
Off-site disposal costs include T&D only.
Engineered control to provide protection from direct contact from 2 ppm < PCBs < 10 ppm.
Maintenance costs are 8% of capital costs. Capital costs for maintenance are identified in *italics*.
Geotextile assumed 40mil.
A 15% wastage is assumed on multi-layer cap materials (geotextile, HDPE).

400288

TABLE B-5
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE S-5: LOW TEMPERATURE THERMAL DESORPTION WITH MULTI-LAYER CAP
COST ESTIMATE

	Estimated Quantities	Units	Labor Unit Price	Labor Cost	Equipment Unit Price	Equipment Cost	Material Unit Price	Material Cost	Total Construction Costs
Multi-Layer Cap									
Clearing and Grubbing	8.4	acre	$208.52	$1,751.57	$412.51	$3,465.08	$0.00	$0.00	$5,216.65
Top Soil (6")	16000	cu yd	$2.95	$47,200.00	$2.21	$35,360.00	$23.25	$372,000.00	*$454,560.00*
Clean Fill (12")	31000	cu yd	$4.00	$124,000.00	$3.50	$108,500.00	$17.23	$534,130.00	*$766,630.00*
Drainage Sand (6")	16000	cu yd	$4.00	$64,000.00	$3.50	$56,000.00	$17.55	$280,800.00	*$400,800.00*
Compaction (24")	63000	cu yd	$0.91	$57,330.00	$0.25	$15,750.00	$0.00	$0.00	*$73,080.00*
Geotextile (2 layer)	2000000	sq ft	$0.50	$1,000,000.00	$0.00	$0.00	$0.35	$700,000.00	*$1,700,000.00*
HDPE Liner	1000000	sq ft	$0.25	$250,000.00	$0.00	$0.00	$0.75	$750,000.00	*$1,000,000.00*
Vegetation	19.4	acre	$75.00	$1,455.00	$100.00	$1,940.00	$1,500.00	$29,100.00	*$32,495.00*
Capacitor Disposal Area									
Excavation	7500	cu yd	$1.83	$13,725.00	$3.51	$26,325.00	$0.00	$0.00	$40,050.00
Clean Fill	9375	cu yd	$4.00	$37,500.00	$3.04	$28,500.00	$17.23	$161,531.25	$227,531.25
Compaction	7500	cu yd	$0.91	$6,825.00	$0.25	$1,875.00	$0.00	$0.00	$8,700.00
Engineered Control									
Excavation	2300	cu yd	$1.83	$4,209.00	$3.51	$8,073.00	$0.00	$0.00	$12,282.00
Clean Fill	2900	cu yd	$4.00	$11,600.00	$3.04	$8,816.00	$17.23	$49,967.00	*$70,383.00*
Top Soil	1400	cu yd	$3.91	$5,474.00	$3.01	$4,214.00	$23.25	$32,550.00	*$42,238.00*
Compaction	2300	cu yd	$0.91	$2,093.00	$0.25	$575.00	$0.00	$0.00	$2,668.00
Vegetation	0.7	acre	$75.00	$52.50	$100.00	$70.00	$1,500.00	$1,050.00	*$1,172.50*
LTTD									
Mobilization/Demobilization	2	ea	$0.00	$0.00	$0.00	$0.00	$120,000.00	$240,000.00	$240,000.00
Permit/Eng for site	1	ea	$0.00	$0.00	$0.00	$0.00	$40,833.00	$40,833.00	$40,833.00
Excavation	107000	cu yd	$1.83	$195,810.00	$3.51	$375,570.00	$0.00	$0.00	$571,380.00
Debris Segregation	11000	cu yd	$5.49	$60,390.00	$3.51	$38,610.00	$0.00	$0.00	$99,000.00
Indirect Fire, Rental & Oper.	161000	ton	$1.80	$289,800.00	$1.22	$196,420.00	$98.42	$15,845,620.00	$16,331,840.00
Equip. Maint. (8%)	4.5	yr	$0.00	$0.00	$142,222.00	$639,999.00	$0.00	$0.00	$639,999.00
Off-site Disposal									
TSCA Waste	0	ton	$0.00	$0.00	$0.00	$0.00	$157.00	$0.00	$0.00
- Requiring Treatment	0	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$0.00	$0.00
Non-TSCA Waste	16500	ton	$0.00	$0.00	$0.00	$0.00	$70.00	$1,155,000.00	$1,155,000.00
- Requiring Treatment	0	ton	$0.00	$0.00	$0.00	$0.00	$155.00	$0.00	$0.00
Capacitor Disposal Area	10400	ton	$0.00	$0.00	$0.00	$0.00	$270.00	$2,808,000.00	$2,808,000.00
- Requiring Treatment	600	ton	$0.00	$0.00	$0.00	$0.00	$220.00	$132,000.00	$132,000.00

Total Direct Construction Costs (TDCC)	$26,215,859.40
Area Code 07080 Factor at 10%	$2,621,585.94
TDCC Subtotal	$28,837,445.34
Contingency at 20% of TDCC Subtotal	$5,767,489.07
Engineering and Construction Management @ 15% of TDCC Subtotal	$4,325,616.80
Legal and Administrative @ 5% of TDCC Subtotal	$1,441,872.27
Total Construction Cost	$40,372,423.48

Does not include demolition and/or asphalt removal costs.
Does not include utility relocation costs.
Assumes only minor clearing and grubbing with some trees in undeveloped area.
Excavation quantity is based on in-place soil volume.
Clean fill includes 25% extra for fluff.
Capacitor Disposal Area disposal costs include T&D only.
Engineered control to provide protection from direct contact from 2 ppm < PCBs < 10 ppm.
Maintenance costs are 8% of capital costs. Capital costs for maintenance are identified in *italics*.
Geotextile assumed 40mil.
A 15% wastage is assumed on multi-layer cap materials (geotextile, HDPE).
LTTD based on throughput of 20 tons/hr, 10 hrs/d, 5 d/wk, 36 wks/yr.
Assume debris segregation is approximately 10%, and debris can be disposed of as non-hazardous.

Equipment Maintenance	$639,999.00
Maintenance (8% Capital Cost)	*$363,308.68*
20% Contingency	$72,661.74
Annual O&M	$435,970.42
30 years	
1% discount rate	
Present Worth Total Maintenance Cost	$11,251,397.29
Total Present Worth	**$52,263,819.77**

400289

TABLE B-6
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE B-1: NO ACTION
COST ESTIMATE

	Estimated Quantities	Units	Labor		Equipment		Material		Total Construction Costs
			Unit Price	Cost	Unit Price	Cost	Unit Price	Cost	
No Action			$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
								Total Present Worth	**$0.00**

400290

TABLE B-7
CORNELL-DUBILIER ELECTRONICS SITE
ALTERNATIVE B-2: BUILDING DECONTAMINATION AND SURFACE ENCAPSULATION
COST ESTIMATE

Building No	Area (ft²)	Decon Cost [1]	Encapsulation Cost [2]	
Bldg. 1				
Floor	46800	$301,860.00	$340,704.00	
Ceiling/Walls	76800	$495,360.00	$86,016.00	
			Bldg. Cost	$1,223,940.00
Bldg. 2				
Floor	26675	$172,053.75	$194,194.00	
Ceiling/Walls	53935	$347,880.75	$60,407.20	
			Bldg. Cost	$774,535.70
Bldgs. 3 & 4				
Floor	34000	$219,300.00	$247,520.00	
Ceiling/Walls	82740	$533,673.00	$92,668.80	
			Bldg. Cost	$1,093,161.80
Bldg. 5				
Floor	42900	$276,705.00	$312,312.00	
Ceiling/Walls	70950	$457,627.50	$79,464.00	
			Bldg. Cost	$1,126,108.50
Bldg. 6				
Floor	4000	$25,800.00	$29,120.00	
Ceiling/Walls	10560	$68,112.00	$11,827.20	
			Bldg. Cost	$134,859.20
Bldg. 7				
Floor	1500	$9,675.00	$10,920.00	
Ceiling/Walls	4900	$31,605.00	$5,488.00	
			Bldg. Cost	$57,688.00
Bldg. 8				
Floor	12500	$80,625.00	$91,000.00	
Ceiling/Walls	22100	$142,545.00	$24,752.00	
			Bldg. Cost	$338,922.00
Bldg. 9				
Floor	39600	$255,420.00	$288,288.00	
Ceiling/Walls	65760	$424,152.00	$73,651.20	
			Bldg. Cost	$1,041,511.20
Bldg. 10				
Floor	6050	$39,022.50	$44,044.00	
Ceiling/Walls	19150	$123,517.50	$21,448.00	
			Bldg. Cost	$228,032.00
Bldgs. 11 & 12				
Floor	10000	$64,500.00	$72,800.00	
Ceiling/Walls	44879	$289,469.55	$50,264.48	
			Bldg. Cost	$477,034.03
Bldg. 13				
Floor	4500	$29,025.00	$32,760.00	
Ceiling/Walls	11100	$71,595.00	$12,432.00	
			Bldg. Cost	$145,812.00
Bldg. 14				
Floor	5200	$33,540.00	$37,856.00	
Ceiling/Walls	13870	$89,461.50	$15,534.40	
			Bldg. Cost	$176,391.90
Bldg. 15				
Floor	2800	$18,060.00	$20,384.00	
Ceiling/Walls	8520	$54,954.00	$9,542.40	
			Bldg. Cost	$102,940.40
Bldg. 16				
Floor	3700	$23,865.00	$26,936.00	
Ceiling/Walls	11020	$71,079.00	$12,342.40	
			Bldg. Cost	$134,222.40
Bldg. 17				
Floor	900	$5,805.00	$6,552.00	
Ceiling/Walls	3600	$23,220.00	$4,032.00	
			Bldg. Cost	$39,609.00
Bldg. 18				
Floor	875	$5,643.75	$6,370.00	
Ceiling/Walls	3755	$24,219.75	$4,205.60	
			Bldg. Cost	$40,439.10
			Total Direct Construction Costs (TDCC)	$7,135,207.23
			Area Code 07060 Factor at 10%	$713,520.72
			Contingency at 20% of TDCC	$1,427,041.45
			Engineering and Construction Management @ 15% of TDCC	$1,070,281.08
			Legal and Administrative @ 5% of TDCC	$356,760.36
			TOTAL COST	$10,702,810.85

Encapsulation Subtotal	$2,325,835.68
Maintenance (8% cost)	$186,066.85
Contingency (20%)	$37,213.37
Annual O&M	$223,280.23
30 years	
1% discount rate	
PW Total Maintenance Cost	$5,762,350.91
Relocation Costs	
Re-establishment Cost	$10,000.00
Moving Expenses	$50,000.00
Total (18 tenants)	$1,080,000.00
Oversight (11%)	$118,800.00
Total Relocation Costs	$1,198,800.00
Total Present Worth	$17,663,961.75

Notes
1 Decon costs for floor and walls/ceiling is $6.45 per square foot.
2 Surface Encapsulation costs are $7.28 per square foot for floor and $1.12 per square foot for ceiling/walls

400291

TABLE B-8 [1]
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE
ALTERNATIVE B-3: BUILDING DEMOLITION
COST ESTIMATE

Building Dimensions (LxWxH) [2, 3]	UNIT	1 (includes 1, 1A, 1B, and 1C) 260' x 180' x 18'	2 (includes 2 and 2A) 100' x 110' x 18' (bldg 2) 165' x 95' x20' (bldg 2A)	3 & 4 (includes 4 and 4A) 100' x 140' x 50' (bldg 3) 80' x 125' x 20' (bldg 4) 80' x 125' x 12' (bldg 4A)	5 (includes 5 and 5A) 260' x 165' x 25'	6 100' x 40' x 20'	7 60' x 25' x 20'	8 250' x 50' x16'	9 (includes 9, 9A, 9B, and 9C) 220' x 180' x 20'	10 110' x 55' x 30'	11 and 12 (Quonset Huts) 200' x 25' x 20' ea	13 100' x 45' x 15'	14 102' x 51' x 30'	15 40' x 70' x 18'	16 66' x 56' x 30'	17 30' x 30' x 15'	18 25 x 35' x 16'	Total Quantity	Unit	Labor	Equipment	Materials	Total	Cost
Remove concrete slab on grade (<8')	SF	46,800	26,675	34,000	42,900	4,000	1,500	12,500	39,600	6,050	10,000	4,500	5,200	2,800	3,700	900	875	242,000	SF	$0.59	$0.20	$0.00	$0.79	$191,180
Remove carpeting	SF	2,000	5,500	3,000	500	1,600			2,000									14,600	SF	$0.23	$0.00	$0.00	$0.23	$3,358
Remove wood floor	SF													2,800				2,800	SF	$0.49	$0.00	$0.00	$0.49	$1,372
Remove roof (built up)	SF	46,800	26,675	34,000	42,900		1,500	4,000	39,600			5,200		2,800	3,700	900	875	208,950	SF	$0.62	$0.33	$0.00	$0.95	$198,503
Remove concrete roof	SF					4,000												4,000	SF	$2.40	$0.46	$0.00	$2.86	$11,440
Remove misc. roof (i.e., vent, louver, etc.)	EA	10	8	10	10	4	4	4	10	2	2	4	2	2	4	2	2	80	EA	$86.10	$0.00	$0.00	$86.10	$6,888
Remove concrete beams	CF					400						24						424	CF	$11.60	$2.22	$0.00	$13.82	$5,860
Remove concrete support	CF													624				624	CF	$10.39	$1.99	$0.00	$12.38	$7,725
Remove concrete columns	CF											2,160						2,160	CF	$10.39	$1.99	$0.00	$12.38	$26,741
Remove steel beams and columns	TON	254	31	32	48	11		15	51	2				12	20			476	TON	$278.94	$16.07	$0.00	$295.01	$140,277
Remove masonry wall (12")	SF	25,200	16,800	20,200	15,400	5,600		9,600	25,600			3,250		5,100	5,525	1,800	2,000	136,075	SF	$1.38	$0.26	$0.00	$1.64	$223,163
Remove interior walls	SF										1,500	2,250	1,020					4,770	SF	$0.63	$0.00	$0.00	$0.63	$3,005
Remove panel/sheet rock	SF	4,800	5,400	3,200	200	960			2,400	1,500								18,460	SF	$0.67	$0.63	$0.00	$1.30	$23,998
Remove wood wall	SF			3,420	6,800		3,400			6,600				1,000	1,000			22,220	SF	$0.67	$0.63	$0.00	$1.30	$28,886
Remove exterior wood wall	SF												6,700					6,700	SF	$0.63	$0.00	$0.00	$0.63	$4,221
Remove exterior siding	SF												6,700					6,700	SF	$0.63	$0.00	$0.00	$0.63	$4,221
Remove wood roof truss structure	SF			10,000			1,500			6,050			5,200					22,750	SF	$0.62	$0.33	$0.00	$0.95	$21,613
Remove metal roof	SF									6,050	34,800							40,850	SF	$0.50	$0.00	$0.00	$0.50	$20,425
Remove piping to 4"	LF	10,000	10,000	5,000	1,000	500	400	500	10,000	500	1,500	6,000	6,000	6,000	2,000	100	100	59,600	LF	$3.15	$0.00	$0.00	$3.15	$187,740
Remove piping to 8"	LF	1,000	1,000	500	200	100	100	100	1,000					1,000	500	50	50	5,600	LF	$6.95	$0.00	$0.00	$6.95	$38,920
Remove piping to 16"	LF													70				70	LF	$13.90	$0.00	$0.00	$13.90	$973
Remove lavatory/urinal	EA	8	4	6	4	4	2	4	8	4	4	2	2	2	2	2	2	60	EA	$70.00	$0.00	$0.00	$70.00	$4,200
Remove misc. fixtures	EA	10	8	10	8	8	4	8	10	4	5	5	5	5	5	2	2	99	EA	$45.00	$0.00	$0.00	$45.00	$4,455
Remove electrical conduits	LF	5,000	5,000	5,000	3,000	1,000	500	1,000	5,000	6,000	6,000	6,000	6,000	2,000	1,000	200	200	52,900	LF	$2.50	$0.00	$0.00	$2.50	$132,250
Remove duct < 2 ft.	LF	800	800	1,000	1,000	500	300	500	800	800	800	200	200	200	200	100	100	8,300	LF	$2.87	$0.00	$0.00	$2.87	$23,821
Remove duct > 2 ft.	LF	400	400	500	500	100	100	100	400	400	400	100	100	100	100	25	25	3,750	LF	$4.30	$0.00	$0.00	$4.30	$16,125
Select backfill	CY													1,000				1,000	CY	$0.00	$0.00	$7.95	$7.95	$7,950
T&D of non-hazardous material	TON	2,720	1,800	3,600	3,600	270	90	720	3,150	675	720	270	450	360	450	90	90	19,055	TON	$0.00	$0.00	$91.58	$91.58	$1,745,057
T&D of hazardous material	TON	680	200	400	400	30	10	80	350	75	80	30	50	40	50	10	10	2,495	TON	$0.00	$0.00	$250.00	$250.00	$623,750

Total Direct Construction Costs (TDCC)	$3,708,116
Area Code 07080 Factor at 10%	$370,812
TDCC Subtotal	$4,078,927
Contingency at 20% of TDCC	$815,785
Engineering and Construction Management @ 15% of TDCC	$611,839
Legal and Administrative @ 5% of TDCC	$203,946
Relocation Costs[4]	
Re-establishment Cost	$10,000.00
Moving Expenses	$50,000.00
Total (18 tenants)	$1,080,000.00
Oversight (11%)	$118,800.00
Total Relocation Costs	$1,198,800.00
Total Present Worth	6,909,298

Notes:

1. The major facilities and construction components listed in this table were based on "best estimates" obtained during a field reconnaissance on February 11, 2003.
   Does not include dust control partitions
   Does not include utility markouts and relocation
   No lead paint or asbestos survey was performed. Costs do not reflect any special handling
2. Building dimensions obtained from Figure 1-2, "Facility Property Map" from "Final Remedial Investigation Report for OU-2," December 2002.
3. Building heights are estimated and were obtained by visual inspection during the field reconnaissance.
4. Estimated that 18 tenants may be eligible for relocation.